A PASSION FOR PERFECTION

PFEIFFER VACUUM

# Pascal series

**Rotary vane pumps 5 to 21m³/h**

# Operating instructions

Translated from original version

EN

adixen
by PFEIFFER VACUUM

# Welcome

## Rotary vane pumps

Dear customer,

You have just bought an adixen rotary vane pump.

We would like to thank you and are proud to count you among our customers.

This product is a result of experience acquired over many years by adixen Vacuum Products in the design of rotary vane pumps.

**We suggest that you read these operating instructions, particularly the chapter on installation and operation, before you start to use this pump so that you can obtain optimum levels of performance and complete satisfaction from this equipment.**

**APPLICATIONS:**

- RESEARCH AND DEVELOPMENT
  Physics and chemistry laboratories, etc...
- INDUSTRY
  Foodstuffs (freeze-drying), Pharmaceuticals, Electronic tube manufacture, Metallurgy, Drying systems, Refrigeration systems, Chemical industry, etc...
- INSTRUMENTATION
  Mass spectrometetry, Centrifuges, Electronic microscopes, Leak detection systems, etc...
- VARIOUS SEMICONDUCTOR PROCESSES

**This product is designed to gererate vacuum by pumping on gases, but no liquids neither solids. It is dedicated for running in industrial environments.**
**The pumps must not be operated in an area with risk of explosion. Consult the nearest support service to study a solution.**

**The performance and operational safety of this product are guaranteed provided it is used normally in the operating conditions defined in this operating manual.**

**It is the customer's task to:**

**- train operators to use the product if they do not speak the language the operating manual is written in,**
**- ensure operators know the safe practices to apply when using the product.**

**This product complies with the requirements of European Directives. listed in the Declaration of Conformity contained in page 63 of this operating manual.**

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**Specifications and information are subject to change without notice by adixen Vacuum Products.**

| Symbol / Label | Description |
|---|---|
| | Warning: high temperature hazard |
| | Warning: electrical shock hazard |
| | Danger: refer to operating instructions |
| ~ | Alternative current |
| \| | Power ON switch |
| O | Power OFF switch |
| | Earth terminal |
| **IN** | Pump inlet flange |
| **OUT** | Pump exhaust flange |

**CAUTION**

**Indicates a potentially hazardous situation which, if not avoided, could result in property damage.**

**⚠ CAUTION**

**Indicates a potentially hazardous situation which, if not avoided, could result in moderate or minor injury. It may also be used to alert against unsafe practices.**

**⚠ WARNING**

**Indicates a potentially hazardous situation which, if not avoided, could result in death or severe injury.**

**⚠ DANGER**

**Indicates an imminently hazardous situation that, if not avoided, will result in death or severe injury (extreme situations).**

**Before switching on the product, study operating instructions and make sure you follow the safety instructions it gives. You can recognise these by the 'Caution', 'Warning' and 'Danger' symbols.**
**Good practice tips and manufacturer's recommendations are in a grey box.**

MANUAL P/N: **103275**
EDITION: **08 - July 2012**

***Translated from original version***

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# Presentation of the product range

## A wide range

**Specific solutions adapted to various applications**

Oil seal rotary vane pumps are used in all vacuum technology applications.

They can be used on their own to achieve a maximum vacuum of 0.75 Torr ($10^{-3}$ mbar), or in pumping assemblies, e.g. at the exhaust of a diffusion pump or turbomolecular pump.

**SD Series** **Standard pumps for several purposes (non-corrosive applications)**.
Manufacture of light bulbs, production of TV tubes, manufacture of electronic tubes, metallurgy, centrifuges, etc.

**I, SDI Series** **Pumps designed to meet the requirements of analytical instrumentation and R&D**.
Mass spectrometer, electronic microscopes, GC/MS, LC/MS, gas analyzers, leak detectors, sterilizers, etc.

**C1 Series** **Pumps suited to the pumping of corrosive gases.**
R&D, laboratories, freeze-drying, pumping of solvents, etc.

**C2 Series** **Pumps with increased resistance to meet the requirements of the more aggressive processes of the semiconductor industry.**
Ion implantation, sputtering, etc.

**H1 Series** **Sealed pumps offering maximum tightness.**
Pumping of pure or precious gases:
- Helium 3 used by cryogenists,
- Radioactive gases used in nuclear applications, either for the recycling of CFC or refrigerated gas.

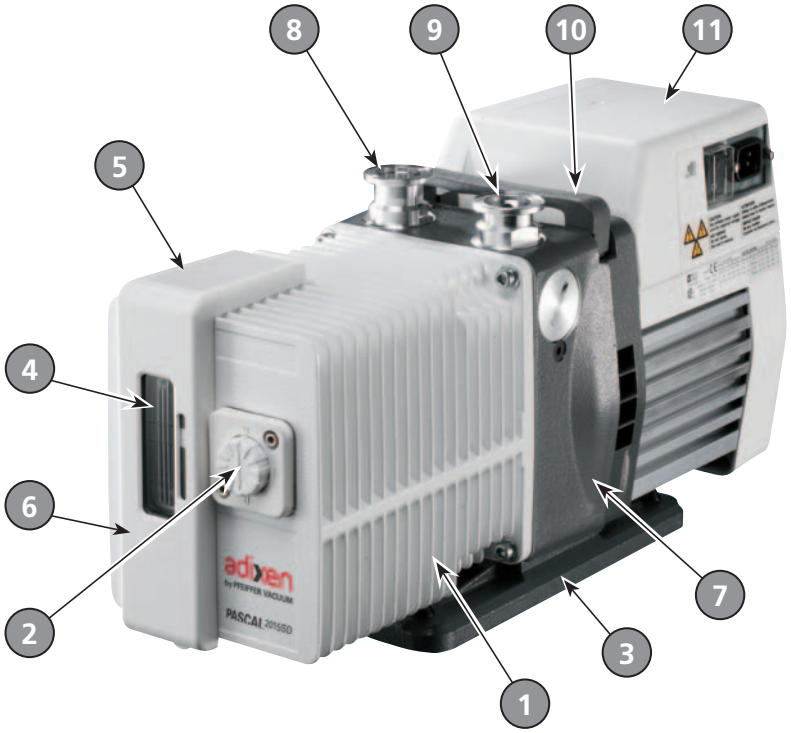
| Nom. fl. rate | $m^3/h$ | 5 | 10 | 15 | 21 |
|---|---|---|---|---|---|
| I series | 2 stages | 2005I | 2010I | 2015I | 2021I |
| SD series | 1 stage | 1005SD | / | 1015SD | / |
| | 2 stages | 2005SD | 2010SD | 2015SD | 2021SD |
| SDI series | 2 stages | 2005SDI | / | / | / |
| C1 series | 2 stages | 2005C1 | 2010C1 | 2015C1 | 2021C1 |
| C2 series | 2 stages | / | 2010C2 | 2015C2 | 2021C2 |
| H1* series | 2 stages | 2005H1 | / | 2015H1 | / |

* See 2005 - 2015 Series H1 operating instructions.

# 5 to 21 $m^3/h$ rotary vane pumps I, SD, SDI, C1, C2 Pascal series

The 5 to 21 $m^3/h$ pump models have following main characteristics:

- A **direct drive motor,** making them very compact.
- An electrically insulated **fold-away handle** is used for easy carrying.
- An **anti-suckback system** ensures the tightness of the pump during accidental or voluntary shutdowns.
- The universal three-phase or single- phase **motor** can be disassembled **independently** of the rest of the pump, without the need to drain the oil case.
- On the oil case, a **vertical sight glass** can be used to inspect the oil level easily when filling the tank and during the operation of the pump.
- A **gas ballast** enables the pumping of condensable vapours (except for C2 series).
- A **neutral gas purge** is used to degas oil and dilute pumped gases on C2 series models.
- A **second inlet port is available** for instrumentation needs (model SDI).




1. Oil case
2. Gas ballast control
3. Base
4. Oil level sight glass
5. Filling plugs
6. Draining plug (under oil sight glass cover)
7. Frame
8. Inlet end fitting
9. Exhaust end fitting
10. Fold-away handle
11. Electric motor (single-phase or Three-phase)

The inlet and exhaust end fittings are PNEUROP ISO-KF standardized.
They are fitted vertically on the pump at delivery but can be positioned on the horizontal openings if required by operating conditions.
They can be used to connect many of our accessories (***see page 12***).

The main remplacement parts are interchangeable: This enables easier disassembly-assembly operations and replacement without changing the pump's performance.

Various accessories can be used to adapt the pump to meet the requirements of your application.

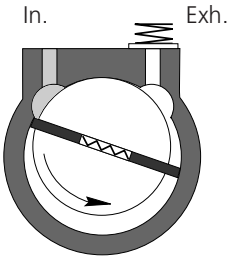
# Operating principle of the rotary vane pump

## Single-stage rotary vane pump

This is a volumetric pump, with a functional part composed of:
- A hollow cylindrical stator with inlet and exhaust valves.
- A rotor mounted eccentrically inside the stator for pumping.
- Two vanes sliding in the rotor, forced against the stator by centrifugal force and springs.

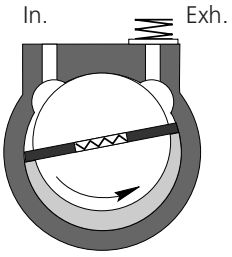
## The pumping cycle is given below:

**Inlet**



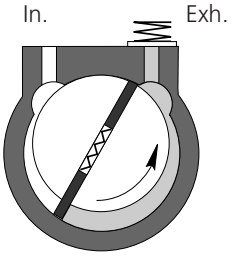

As the vane passes in front of the inlet orifice, an increasing space is formed into which the gas from the chamber to be evacuated expands.
When the second vane passes, the space is closed.

**Transfer**



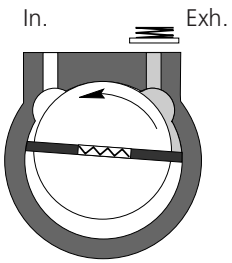

The gas trapped in the space between the two vanes is transferred to the exhaust orifice as the rotor rotates.

**Compression**




The space communicates with the exhaust, which is fitted with a valve: the gas is compressed until the safety valve is opened.

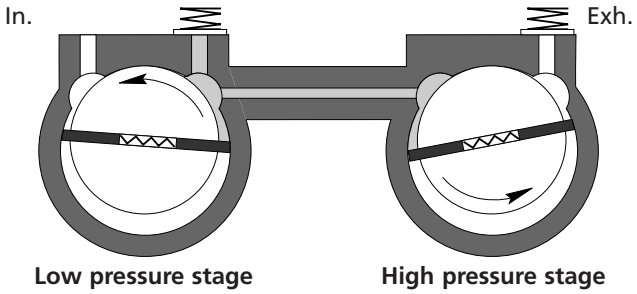
**Exhaust**




The gas is expelled into the oil casing when the pressure is sufficient to open the valve.

## Two-stage rotary vane pump

To improve the backing pressure and flowrate at low pressure, two stages are connected in series. The second is similar to the first both structurally and operationally. The gases pulled in by the first (low pressure) stage are transferred to the second (high pressure) stage and discharged through the high pressure (HP) valve.




**Applications**

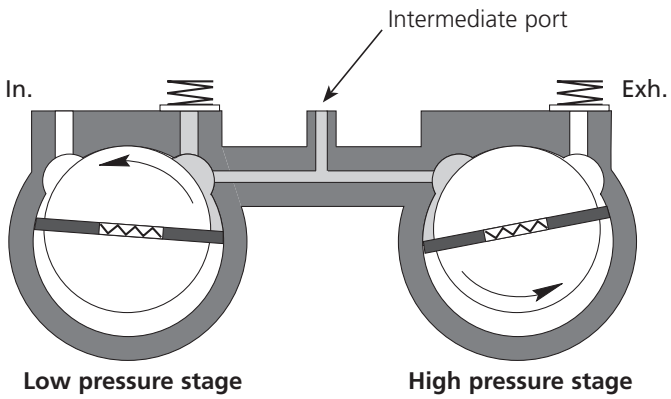
These rotary vane pumps are the best choice for application requiring an ultimate vacuum as low as 1.5 x $10^{-3}$ Torr (2 x $10^{-3}$ mbar).

**Note:** when operating a two stage vane pump continously, greater than half an hour
- above 1.0 Torr,
- or with opened gas ballast,

the unit should be equipped with an oil mist eliminator with an oil return system.

## SDI Series

These pumps integrate 2 models in a single product:
- they work as a two stage pump when the inlet port is connected,
- they work as a single stage pump when they are pumping through the intermediate port.




**Applications**

They are used in applications which require in a meantime a good level of ultimate vacuum and the pumping of tracer gas.
In example, in leak detection, it is necessary to reach low pressure into the analyzer cell by pumping via the pump inlet, and to pump a tracer gas as Helium through the intermediate port.

# Oil

**Its function**

Oil has several important functions in the pump:
– It lubricates mechanical components (bearings, seals, rotor, vanes, etc.).
– It makes moving parts relatively tight by limiting internal leakage.
– It carries away the heat produced by the compressed gases.

**Choosing the right oil**

Not all oils produce the same ultimate pressure in a given pump. Ultimate pressure depends on the saturated vapour pressure of the oil, its viscosity and its ability to dissolve gases.

Good pumping conditions are related to the type of oil used. The choice depends on:
– Expected pump performance.
– Chemical aggression and corrosion of pumped gases.
– Accessories used.
– Desired maintenance intervals and total operating cost.

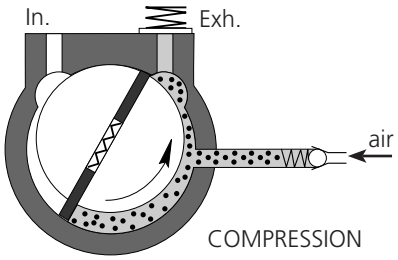
The manufacturer has selected various types of oil for its pumps (***see page 18***).

## Lubrication and anti-noise device

The pump is equipped with a **lubrication** system which regulates the oil flow rate required in the vacuum pump. In addition this system also ensures the gassing of the lubrication oil and therefore **the low noise level** of the pump.

## Gas ballast

When condensable vapours are being pumped, gas is compressed beyond its saturated vapour pressure in the "compression" phase and can condense, impairing pump performance.




The gas ballast can be used to inject a certain quantity of air (neutral or dry gas) into the last stage of the pump during the "compression" phase so that the partial pressure of the pumped gas is less than its saturated vapour pressure at the temperature of the pump. Condensation is therefore impossible if this limit is not reached. The maximum admissible vapour pressure is obtained at pump inlet for this value.

At the end of "compression", the pressure in the exhaust chamber is greater than atmospheric pressure. An anti-suckback device (valve + spring) prevents the gases and oil from being drawn back into the inlet.

The saturated vapour pressure of a body is higher when the system is hot than when it is cold; therefore, the pump must reach operating temperature before pumping condensable vapours.

**⚠ CAUTION**

- **Using the gas ballast increases the ultimate pressure of the pump as well as the temperature.**
- **The gas ballast control, located at the front of the oil case cannot be used to set the gas injection flow rate.**
- **When the gas ballast control is open, the pump is not tight when stopped. To guarantee this tightness, install an automatic gas ballast.**
- **The functioning in permanent regime with opened gas ballast draws away important oil losses (mist) by exhaust: use an accessory OME 25 HP + ODK (*see page 14*) and control the oil level very often.**
- **C1 and C2 pump series:**
  **Because of the danger present if the gas ballast (C1 series) or bubbler (C2 series) was to be opened to atmosphere, connect the ports to a neutral gas supply line (*see page 34*).**

# Technical characteristics

## SD, I, C1 Models

| Characteristics | Unit | 1005 SD | | 1015 SD | | 2005 | | 2010 | | 2015 | | 2021 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | Hz | 50 | 60 | 50 | 60 | 50 | 60 | 50 | 60 | 50 | 60 | 50 | 60 |
| Number of stages | | 1 | | 1 | | 2 | | 2 | | 2 | | 2 | |
| Rotation speed | tr/mn | 1500 | 1800 | 1500 | 1800 | 1500 | 1800 | 1500 | 1800 | 1500 | 1800 | 1500 | 1800 |
| Nominal pumping speed | $m^3/h$ | **5.4** | **6.5** | **15** | **18** | **5.4** | **6.5** | **9.7** | **11.6** | **15** | **18** | **20.7** | **24.8** |
| | cfm | | 3.8 | | 10.6 | | 3.8 | | 6.8 | | 10.6 | | 14.6 |
| Pneurop pumping speed | $m^3/h$ | **4.8** | **5.5** | **12.5** | **15** | **4.8** | **5.7** | **8.5** | **10.2** | **12.5** | **15** | **16.5** | **20** |
| | cfm | | 3.2 | | 8.8 | | 3.4 | | 6 | | 8.8 | | 11.8 |
| Max. pumping speed | $m^3/h$ | **4.5** | **5.5** | **13.5** | **16** | **4.8** | **5.5** | **9.7** | **11.6** | **15** | **18** | **20.7** | **24.8** |
| Max. Gas throughput | mbar.l/s | **1256** | **1547** | **3805** | **4500** | **1350** | **1547** | **2722** | **3263** | **4222** | **5063** | **5833** | **6977** |
| Partial ultimate pressure [1] | Torr/mbar/Pa | - | | | | | | **$7.5x10^{-5}$ / $1x10^{-4}$** / $1x10^{-2}$ | | | | | |
| Ultimate pressure with gas ballast closed | Torr/mbar/Pa | **$3.75x10^{-2}$ / $5x10^{-2}$** / 5 | | | | | | **$1.5x10^{-3}$ / $2x10^{-3}$** / $2x10^{-1}$ | | | | | |
| Ultimate pressure with gas ballast open [3] | Torr/mbar/Pa | **3 / 4 /** $4x10^2$ | | **5.25 / 7 /** $7x10^2$ | | | | **$7.5x10^{-3}$ / $1x10^{-2}$** / 1 | | | | | |
| Maximum pressure at inlet in continuous operation | | | | | | | | | | | | | |
| • without oil recovery | Torr/mbar/Pa | **< 75 / 100** / $1x10^4$ | | | | | | **< 8 / 10** / $1x10^3$ | | | | | |
| • with oil recovery | | **< 760 / 1013** / $10.13x10^4$ | | | | | | **< 75 / 100** / $1x10^4$ | | | | | |
| Maximum exhaust relative overpressure | bar | **0.50** | | | | | | | | | | | |
| Oil capacity | l | 1.1 | | 1.0 | | 0.83 | | 0.95 | | 0.95 | | 0.98 | |
| Maximum water vapour pumping capacity [1] [3] | mbar | **30** | **25** | **35** | **30** | **35** | **25** | **20** | **15** | **12** | **10** | **7** | **7** |
| | Pa | $3.10^3$ | $25.10^2$ | $35.10^2$ | $3.10^3$ | $35.10^2$ | $25.10^2$ | $20.10^2$ | $15.10^2$ | $12.10^2$ | $1.10^3$ | $7.10^2$ | $7.10^2$ |
| Water vapour pumping capacity | g/h | 120 | 130 | 330 | 370 | 120 | 110 | 125 | 100 | 110 | 100 | 90 | 90 |
| Emission sound pressure level without Gas Ballast [4] | dB (A) | < 52 | < 54 | < 54 | < 56 | < 55 | < 55 | < 55 | < 55 | < 55 | < 56 | < 55 | < 56 |
| Weight (pump + motor) [2] | kg (lbs) | 21 (46) | | 24.5 (54) | | 25 (55) | | 26 (57) | | 27 (59.5) | | 28 (62) | |
| Inlet and exhaust end fittings | | DN 25 ISO-KF | | | | | | | | | | | |

[1].....Partial ultimate pressure and vapor pressure measured according to Pneurop 6602 specifications with A120 oil charge for SD, I, SDI, C1 series. It may vary if other oils are used (***see page 18***).

[2]..... These values are for pumps equipped with single-phase motors.

**Note:** The pressure measurements were made with a capacitive diaphragm pressure gauge measuring a total pressure in the absence of a cold trap. Measurements using a Pirani type gauge can give different pressure values.

[3]..... Vapor pressure measured with an automatic gas ballast.

[4]..... The sound level of I, C1, C2 model is under this maximum value.

## SDI Models

The SDI pump characteristics correspond to the SD model (***see table above***) when the intermediate port is at low pressure < 1mbar.

| Pumping through intermediate port | Unit | 2005 SDI |
|---|---|---|
| Ultimate pressure | mbar | < 1 |
| Flow rate (at ultimate pressure) | $m^3/h$ | ≥ 0.1 |
| Connecting port | | 1/8 Gas female equipped with a plug. Customer is in charge of the connection. |

The pressure at the intermediate port increases versus the pumping speed.

The manufacturer guarantees the maximum pumping speed and the ultimate pressure. The complete product performance depends on the customer's application.

# Technical characteristics (cont'd)

## C2 Models

| Characteristics | Unit | 2010 C2 | | 2015 C2 | | 2021 C2 | |
|---|---|---|---|---|---|---|---|
| Frequency | Hz | 50 | 60 | 50 | 60 | 50 | 60 |
| Number of stages | | 2 | | 2 | | 2 | |
| Rotation speed | tr/mn | 1500 | 1800 | 1500 | 1800 | 1500 | 1800 |
| Nominal pumping speed | $m^3/h$ | **9.7** | **11.6** | **15** | **18** | **20.7** | **24.8** |
| | cfm | | 6.8 | | 10.6 | | 14.6 |
| Pneurop pumping speed | $m^3/h$ | **8.5** | **10.2** | **12.5** | **15** | **16.5** | **20** |
| | cfm | | 6 | | 8.8 | | 11.8 |
| Max. pumping speed | $m^3/h$ | **9.7** | **11.6** | **15** | **18** | **20.7** | **24.8** |
| Max. Gas throughput | mbar.l/s | **2722** | **3263** | **4222** | **5063** | **5833** | **6977** |
| Emission sound pressure level without Gas Ballast [4] | dB (A) | < 52 | < 54 | < 53 | < 54 | < 53 | < 55 |
| Partial ultimate pressure [1] | Torr/mbar/Pa | **$3.75x10^{-4}$ / $5x10^{-4}$ /** $5x10^{-2}$ | | | | | |
| Ultimate pressure with gas ballast closed | Torr/mbar/Pa | **$2.25x10^{-3}$ / $3x10^{-3}$ /** $3x10^{-1}$ | | | | | |
| Maximum pressure at inlet in continuous operation | | | | | | | |
| • without oil recovery | Torr/mbar/Pa | **< 8 / 10 /** $1x10^3$ | | | | | |
| • with oil recovery | | **< 75 / 100 /** $1x10^4$ | | | | | |
| Maximum exhaust relative overpressure | bar | **0.50** | | | | | |
| Oil capacity | l | 0.95 | | 0.95 | | 0.98 | |
| Weight (pump + motor) [2] | kg (lbs) | 26 (57) | | 27 (59.5) | | 28 (62) | |
| Inlet and exhaust end fittings | | DN 25 ISO-KF | | | | | |

[1] ..... Partial ultimate pressure and vapor pressure measured according to Pneurop 6602 specifications with A113 oil charge. It may vary if other oils are used (***see page 18***).

[2] ..... These values are for pumps equipped with single-phase motors.

[4] ..... The sound level of I, C1, C2 model is under this maximum value.

**Note:** The pressure measurements were made with a capacitive diaphragm pressure gauge measuring a total pressure in the absence of a cold trap. Measurements using a Pirani type gauge can give different pressure values.

## Materials

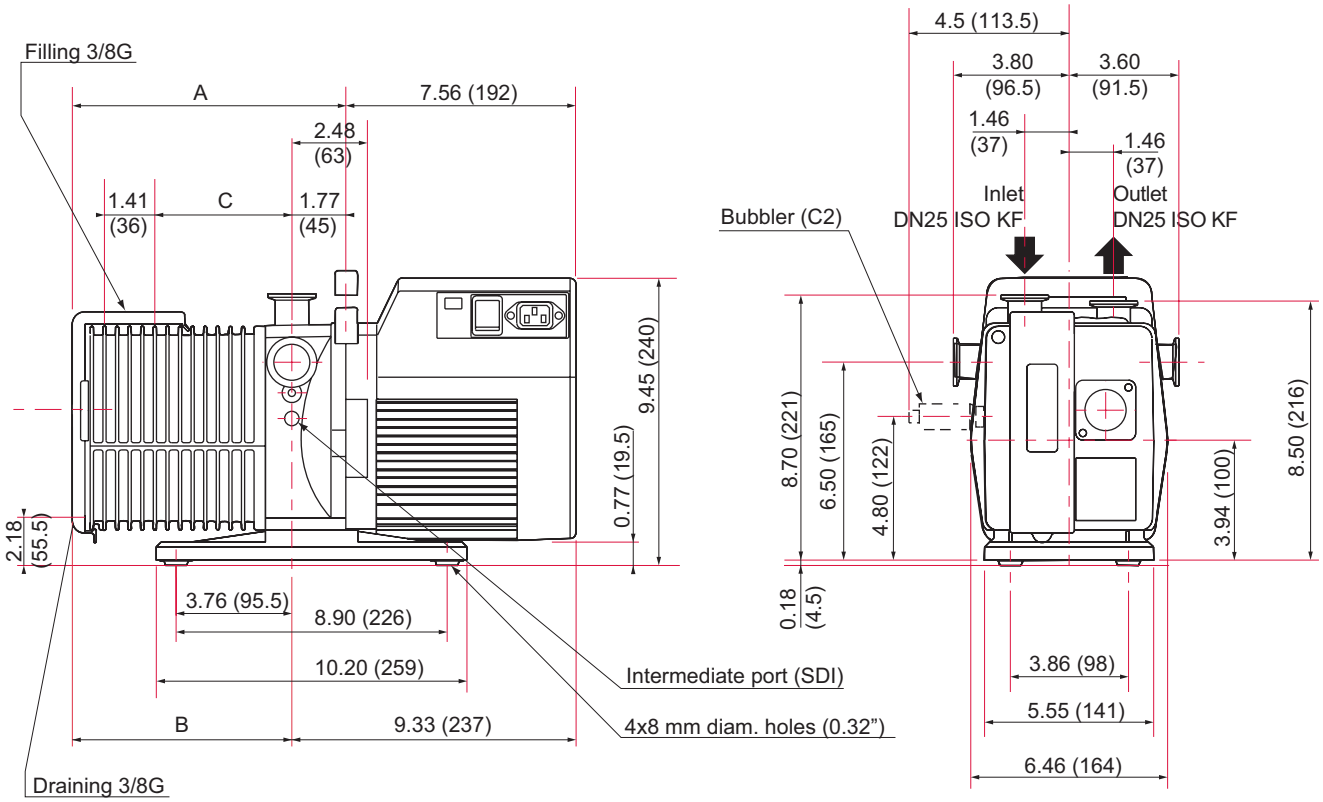
The pumps are made in different materials to address the requirements of all major vacuum applications.

| Materials | I, SD, SDI Models | C1 Models | C2 Models |
|---|---|---|---|
| Valves | FPM | | |
| Optional valves | PAI | | |
| Oil level sight glass | PA | Glass | PA |
| O-rings, lip seal | FPM or NBR | | FPM |
| Rotors | Carbon steel | | |
| HP, LP vanes | Abestosfree plastic | | |
| Stators, central housing, plates | Cast iron (without Cu Zn, Cad) | | |
| Oil casing, central housing | Aluminium | | |
| Friction ring (seal holder) | Chrome steel | | |
| Friction ring (functional block) | Cast iron | Graphite | |

## Environmental conditions

| | |
|---|---|
| Use of the product | Indoor use |
| Operating altitude | < 2000 m |
| Ambient operating temperature<br>Model SD, I, SDI, C1<br>Model C2 | <br>Mini 12°C (53°F) / Maxi 40°C (104°F)<br>Mini 15°C (59°F) / Maxi 40°C (104°F) |
| Storage temperature | Mini 5°C (41°F) / Maxi 65°C (149°F) |
| Maximum relative humidity | 80% for temperature up to 31°C (87°F)<br>decreasing linearly to 50% at 40°C (104°F) |
| Transient overvoltage | Category II |
| Pollution degree | 2 |
| Withstand a supply voltage variation | +/- 10% |

# Pump dimensions




| Dim. | Pump type | | | | | |
|---|---|---|---|---|---|---|
| inch (mm) | 1005 | 2005 | 1015 | 2010 | 2015 | 2021 |
| A | 9 (228) | | 9.6 (245) | | 10.6 (270) | 11.5 (291) |
| B | 7 (183) | | 8 (204) | | 8.9 (225) | 9.7 (246) |
| C | 4.55 (115.5) | 4.55 (115.5) | 6.2 (157.5) | 5.4 (136.5) | 6.2 (157.5) | 7.03 (178.5) |

# Accessories

| Name | | I | SD SDI | C1 | C2 | Part number | Location | Fonctions |
|---|---|---|---|---|---|---|---|---|
| **Oil mist eliminator** | **OME 25 S** | ● | ● | | | **104200** | Exhaust | • Separates oil droplets and particles contained in exhaust gases emitted by the pump. |
| | **OME 25 C/H** | ○ | ○ | ● | ● | **066849** | | |
| **High pressure oil mist eliminator** | **OME 25 HP** | ● | ● | | | **104199** | Exhaust | • Separates oil droplets and particles contained in exhaust gases emitted by the pump.<br>For high pressure pumping and/or frequent cycles. Can be fitted to the ODK 1 and ODK 2 kits. |
| | **OME 25 HP+** | ● | ● | | | **108341** | | |
| **Oil draining kit ODK 1** | | ● | ● | | | **104360** | Gas ballast | • Connected to the OME25HP, it is used to recover oil via the gas ballast. Note: the pump is not sealed when switched off. |
| **Oil draining kit ODK 2 *** | | ● | ● | | | **104361 (230V 50/60Hz)**<br>**104362 (115V 60Hz)** | Gas ballast | • Connected to the OME25HP or OME25HP+, it is used to recover oil via the gas ballast. Equipped with an electrovalve which seals the pump when switched off. |
| **Condensate trap CT 25** | | ● | ● | ○ | ○ | **104201** | Inlet or exhaust | • Prevents liquids and solids contained in the pumped gases from entering the pump, or traps condensable vapors at the exhaust. |
| **Dust filter DFT 25** | | ● | ● | | | **104202** | Inlet | • Prevents dust particles larger than 6 microns from entering the pump. |
| **OLS4** | | ● | ● | | | **104376** | On oil casing | • Provides information about oil level inside oil casing of RVP, whenever the pump is located in an unaccessible area. |
| **Liquid nitrogen trap** | **LNT 25 S** | ● | ● | | | **Aluminum 104197** | Inlet | • Protects the pump against condensable vapours.<br>• Prevents oil from backstreaming into pumped chamber. |
| | **LNT 25 C** | ○ | ○ | ● | ● | **St. steel 066889** | | |
| **Sorption trap** | **ST 25 S** | ● | ● | | | **Aluminum 104107** | Inlet | • Prevents oil backstreaming when pumping in a “clean” vacuum. |
| | **ST 25 C** | ○ | ○ | ● | ● | **St. steel 066841 (220V)**<br>**St. steel 066845 (115V)** | | |
| **Automatic gas ballast AGB 4 *** | | ● | ● | ○ | | **104086 (230V 50/60Hz)**<br>**104087 (115V 60Hz)** | Gas ballast | • Remote controlled version of the manual gas ballast. Convenient solution in case of frequent use or difficult access to the manual gas ballast. |
| **Isolating safety valve ISV 25*** | | ● | ● | | | **066832 (220V 50Hz)** | Inlet | • In the event of power failure, it isolates the vacuum chamber from the pumping unit and ensures pump module venting. |
| **Oil filter DE 1** | | ● | ● | ● | ● | **068990 (220V 50/60Hz)**<br>**068991 (115V 50/60Hz)** | External device | • Filters and/or neutralizes oil when pumping gases which are corrosive and could rapidly degrade oil quality. |
| **Oil filter DE 2** | | ● | ● | ● | ● | **104374 (220V 50/60Hz)**<br>**104375 (115V 50/60Hz)** | | |
| **Shock mount** | | ● | ● | ● | ● | **082691**<br>**LAX 100 model D** | Between base and machine frame | • Helps isolate pump vibration.<br>• Allows pump to be mounted on a frame. |

*Other voltages and frequencies available in the adixen catalog.

● Possible without restrictions ○ Possible with restrictions ☐ Out of question

**⚠ WARNING**

- **When pumping on corrosive, aggressives or flammable gases, the gas can cause injury or death. In these cases,**
  - **connect the exhaust of the pump to an exhaust stack or an evacuation duct.**
  - **connect a relief valve or rupture disc directly on the pump. Contact your closest service center (see addresses at the back of operating instructions).**

  **When the exhaust is connected to an extraction duct or an oil mist eliminator, you must remove the exhaust safety valve mounted in the pump's exhaust orifice.**
- **At the pump exhaust, the discharge circuit must be such that the resulting excess pressure in the oil case is as low as possible. The maximum excess pressure recommended for correct pump operation is 0.5 bar (6 PSI).**
  **A slight negative pressure in the oil case (0.1 to 0.2 bar / 1.5 PSI), at the exhaust, will prevent gases from accumulating and reduce pump corrosion and pollution.**
- **For safety reasons, use accessories on the inlet and exhaust lines whose materials and sealing properties are compatible with the gases being used.**

# Safety instructions concerning the installation and operation of pumping systems

**CAUTION**

**Before switching on the equipment, the user must read all of the start-up and operation sections of this operating manual and observe the safety instructions listed in this operating manual.**

## Unpacking

- **We took care to provide you with a clean product. To keep it in this condition, unpack it only in its final place of use.**
- **Make sure the equipment shows no sign of transport damage. If it has been damaged, take the necessary steps to record this with the carrier and inform the manufacturer. In all cases, we recommend keeping the packaging (reusable materials) for further transport of the equipment or for prolonged storage.**

**⚠ WARNING**

- **Vane roughing pumps use lubricants, it is recommended to request information from the manufacturer on the safety data sheets concerning the lubricant. These can be downloaded from www.adixen.com.**
- **The pumps are delivered without an oil charge: the oil is delivered in separate containers.**
  **Wear gloves, protective glasses to fill in or drain the oil in the pumps.**
  **In the same way, it is recommended to drain the pump before returning the equipment.**

## Handling

- **For all handling of the equipment, it is highly recommended to use the handle provided for this purpose. In case of handling by a lifting bridge, use a claw to avoid any pump lack of balance.**
  **The maker can not be held liable for the consequences of not following appropriate safety recommentations.**

**CAUTION**

- **The product is supplied with the inlet and exhaust sealed. These are to prevent foreign bodies entering the pump during transport and storage.**
- **C2 Series: In order to prevent moisture from entering the pump before installation, it has been pressurized before hand with nitrogen and sealed with blanking plates.**
- **Do not remove these blanking plates until you are ready to install the product on the vacuum line.**

## Storage

**New pump**

**C2 series**

If the pump is new and has not been unpacked, store it as received since it has been pressurized with neutral gas at factory.

**Other series**

• If the pump is to be stored, we guarantee the reliability of our equipment without particular storage precautions for up to 3 months (ambient temperature between 41°F and 149°F or 5 and 65°C).

# Safety instructions concerning the installation and operation of pumping systems (cont'd)

## Storage (cont'd)

**New pump (cont'd)**

• For storage periods of over 3 months, we recommend to fill the pump with oil during storage. For this, fill the pump and run it at ultimate vacuum (inlet orifice blocked) for approximately 1 hour in order to lubricate all the parts of the functional block (***see page 30***).

Then, stop the pump and store it with the inlet and exhaust orifices sealed: clamping ring, centering-ring, plug, etc.

The shaft must rotate manually by the fan or by starting the pump every six months following this storage procedure.

• After 3 months storage without oil, factors such as temperature, degree of humidity, salt air, etc. may cause the deterioration of the pump components, particularly the hardening of O-rings and the "sticking" of lip seals on shafts and the gumming of oil. In this state, a pump may have operational problems, particularly oil leaks. Before any start-up (new pump as well as used), the pump must be disassembled (***see page 49***), and all the seals changed.

**Pump which has been used**

If the pump is not new, drain and rinse it (***see page 44***). Fill it with new oil, then pump a dry inert gas through it to remove all traces of dampness in the pumping system and oil casing. Pump in dry inert gas as follows:
- 10 minutes at above 2.25 Torr (30 mbar).
- 10 minutes at ultimate pressure with gas ballast open.
- 10 minutes at ultimate pressure.

Stop the pump and seal the inlet and exhaust orifices tightly with quick connect clamps, centering rings, blank-off flanges...

**Note:**

The seal kits must be stored with caution. Keep them away from heat and light (sunlight and ultraviolet light) in order to prevent the elastomers from hardening (AFNOR standard FD T 46.022).

## Installation and start-up

It is important to isolate the machine from the power source before any intervention on the equipment (for maintenance purposes).

**⚠ CAUTION**

- **The pump must be operated in the horizontal position in support on its base.**
- **Electric shock hazard.**
  **Some components have capacitors charged to over 60VDC. When power is switched off, they keep their charge for a time. Residual voltages from the filter capacitors can cause electric shocks all the way back to the mains plug. Wait 5 minutes after power-off before commencing any work on the product.**
- **Ensure that the product is connected to an electrical installation:**
  **- in compliance with the local and national safety requirements,**
  **- equipped with electrical protection (fuses, circuit breaker, ...) which has a suitable earth (ground) point, properly connected.**

**⚠ WARNING**

- **Do not expose any part of the human body to vacuum.**
  **The product is supplied with the inlet and exhaust sealed. Remove these blanking plates when you are ready to connect the product on your vacuum system.**
  **As well as, don't operate the product unless the inlet and exhaust are connected to a vacuum and exhaust pumping line.**
- **The products are designed to avoid subjecting users to heat hazards. However, specific operating conditions may exist that require extra caution from users due to the high temperatures (outer surfaces > 70° C). Wear protective gloves and leave the pump to cool before working on the product.**

Our pumps are tested in the factory with A120 oil or A119 for the USA (A113 oil for the C2 series).

**It is recommended to use the same oil during operation, because the oils are not mixable (*refer to table page 18 and remplacement fluids page 19*).**

- If changing the type of oil, refer to the chapter concerned for the procedure and the type of lubricant required (***see page 45***).

# Table of recommended oils

**Recommended oils** In the vane pumps, we recommend to use only the adixen oils in the table below:

| Oils | Characteristics and applications | I/SD SDI | C1 | C2 | Density | Viscosity mm²/s (cst) | Vapor pressure at 25°C (mbar) | Total ultimate pressure* (mbar) | Flash point/ self ignition temperature (°C ) |
|---|---|---|---|---|---|---|---|---|---|
| **A102** | Additivated hydro-carbon anti-emulsion mineral oil<br>- oil and water separation (anti-emulsion)<br>- drying and water vapor pumping<br>- freeze-drying | ● | ○ | | 0.88 | 98 to 40°C<br>11.1 to 100°C | $<1.10^{-3}$ | $<3.10^{-2}$ | 230°C<br>260°C |
| **A111** | Hydro-carbon based synthetic oil<br>- stable pumping at high temperature<br>- gas circulation in recycling<br>- oxidation sensitive<br>(frequent atmospheric cycle prohibited) | ● | | | 0.87 | 100 to 40°C<br>7.8 to 100°C | $<1.10^{-3}$ | $<1.10^{-2}$ | 212°C<br>245°C |
| **A113** | Perfluoropolyether (PFPE) synthetic oil<br>- pure Oxygen pumping<br>- highly inert to chemical<br>- highly corrosive gas pumping<br>- plasma etching compatible | ○ | ○ | ● | 1.9 | 90 to 40°C<br>11 to 100°C | $<3.10^{-5}$ | $<5.10^{-3}$ | None<br>None |
| **A119** | Hydro-carbon mineral oil<br>- general purposes (common use at 60 Hz)<br>- non-corrosive products<br>- low viscosity (low temperature starting) | ● | | | 0.86 | 54 to 40°C<br>8.1 to 100°C | $<4.10^{-5}$ | $<3.10^{-3}$ | 213°C<br>244°C |
| **A120** | Hydro-carbon mineral oil non additivated<br>- general purposes (common use at 50 Hz)<br>- non-corrosive products<br>- high viscosity | ● | | | 0.886 | 120 to 40°C<br>12.5 to 100°C | $<4.10^{-5}$ | $<3.10^{-3}$ | 260°C<br>295°C |
| **A121** | Special hydro-carbon double distilled synthetic oil with anti-oxidant additive<br>- atmospheric cycle pumping<br>- high temperature and pressures<br>- acid and organic vapor resistivity<br>- plasma etching prohibited | ● | ○ | | 0.83 | 64 to 40°C<br>10 to 100°C | $<1.10^{-7}$ | $<3.10^{-3}$ | 268°C<br>296°C |
| **A155** | Synthetic oil organic ester type<br>- compatible with hydro-carbon vapors<br>- compatible with NH3, R134a, refrigerating agent fluids<br>- oxidation resistivity<br>- polymerization resistivity (low coating) | ● | ○ | ○ | 0.957 | 94 to 40°C<br>9.1 to 100°C | $<1.10^{-5}$ | $<3.10^{-3}$ | 240°C<br>350°C |
| **A200** | Double distilled mineral oil non additivated<br>- pumping of corrosive products<br>- ionizer plasma resistivity<br>- low backstreaming | ○ | ● | ○ | 0.86 | 58 to 40°C<br>8.5 to 100°C | $<1.10^{-5}$ | $<2.10^{-3}$ | 223°C<br>259°C |
| **A300** | Hydro-carbon based mineral oil, double distilled, non additivated.<br>- highly resistant to chemical attacks<br>- highly ionizer plasma resistivity<br>- pumping of Lewis acids, halogens<br>- low backstreaming | ○ | ● | ○ | 0.86 | 56 to 40°C<br>8.9 to 100°C | $<1.10^{-5}$ | $<5.10^{-3}$ | 243°C<br>270°C |

● Possible without restrictions

○ Possible with restrictions

☐ Not recommended

Requires special preparation of pump (***see page 45***).

* Ultimate pressure measured according to Pneurop 6602 specifications on 2015 pump.

These values are given as a rough guide only. They may vary according to the type of pump and the pumping conditions.

## Recommended oils (cont'd)

**However, the following replacement fluids can be used:**

**Mineral oil:**
ELF MOVIXA PV 100, TURBELF SA 100,
BP CS 100 (BP registered trademark)
SHELL VITREA 100 (SHELL registered trademark)
TOTAL CORTIS PV 100 (TOTAL registered trademark)
INLAND 19, INLAND 20 (INLAND registered trademark)
MR 200 (MATSUMURA registered trademark)

**Mineral-based synthetic oils:**
ELF BARELF F 100, ELF BARELF C 68 (ELF registered trademark)
INVOIL 20 (INLAND registered trademark)
INLAND TW (INLAND registered trademark)
ELITE Z (CAMBRIGE MILL PRODUCTS, INC. reg. trademark)

**Ester type synthetic oils:**
ANDEROL 555 (ANDEROL-BV registered trademark)
ANDEROL RCF 96 N (ANDEROL-BV registered trademark)

**Fluorocarbon synthetic oils:**
FOMBLIN YL VAC 25-6 (MONTEDISON registered trademark)
KRYTOX 15-25 (DU PONT DE NEMOURS registered trademark)
HALOVAC 100 (HALOCARBON registered trademark)
AFLUNOX 15.25 (SCM registered trademark)

Note: In this case, pump performances may be slightly different from those given in pages 9 and 10.

## Filling with oil

**5 to 21 $m^3/h$ I, SD, SDI, C1 series** pumps are tested in the factory with **A120** oil (or **A119** for USA).
**5 to 21 $m^3/h$ C2 series** pumps are tested in the factory with **A113** oil.
At delivery, there is some oil remaining in the functional block.

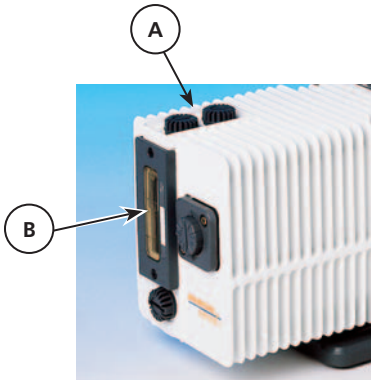
**CAUTION**

- **Our pumps are tested in the factory with adixen's oil: it is recommended to use the same oil during operation. To change the type of oil, refer to the Maintenance Chapter, "replacement of oil type" section page 45.**
  **In all cases, follow the recommendations of the pump specifier for the choice of oil to be used.**
- **The pumps are delivered without an oil charge: the oil is delivered in separate containers.**
  **Wear a mask, gloves, protective glasses to fill in or drain the oil in the pumps.**
  **In the same way, it is recommended to drain the pump before returning the equipment.**

## Filling with oil (cont'd)

If necessary, carry out the special preparation procedure for the pump (***see page 44***), then:

- remove the filling cap (**A**),
- fill with oil until the oil reaches the highest mark on the sight glass (**B**).




**This operation must be performed with the pump switched off.**

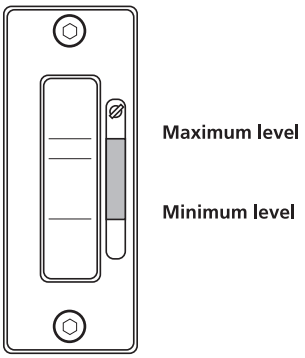
The second filling orifice is used if an external oil filtration device is connected (***see accessories page 12***).

At the first start-up, to facilitate lubrication of the pump, pour a few drops of oil (1 to 2 $cm^3$) through the inlet orifice.

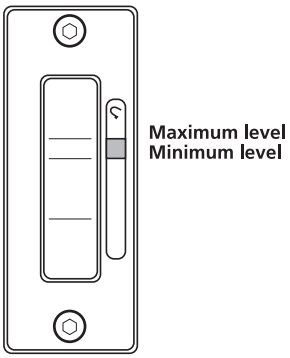
## Checking the oil level

To use the pump in optimum conditions, the oil level must be observed and checked regularly. **This level is checked with the pump switched off, hot and on a horizontal plane.**

**Oil level sight glass for "I, C1, C2" series and 1015 SD**




**Oil level sight glass for "SD, SDI" series except 1015 SD**




**Note:** Optimum pump performance and service life are obtained when the oil level is between the maximum level and the minimum level.

# Mechanical connections



**⚠ CAUTION**

**For a given application, pump performance, vacuum characteristics, temperature and reliability depend on the following:**
- **assembly conditions (accessory, filter...) and mechanical connections,**
- **used oil,**
- **maintenance frequency and quality.**

**For the assembly of the vacuum circuit, provide the accessories required for maintenance: isolation valves, purges, etc.**

**For safety reasons, use accessories on the inlet and exhaust lines whose materials and sealing properties are compatible with the gases being used. Several fitting accessories are available in the adixen products' catalog.**

## Mounting on a frame

The pump can be mounted on a frame using the 4 attachment holes on the base and the special shock mounts supplied (***see accessories page 12***).

**Note:** Special shock mounts, effective against the pump's own vibrations, can also be used but they do not ensure correct attachment during the transfer of equipment. In this case, the pump should be clamped onto its support (***see page 11***).

## Ventilation

The pump and the motor are each equipped with a ventilation system. During pump installation, the pump should be placed in ventilated place. Provide a minimum gap of 25 mm around the pump.

**The vents on the pump and the motor should be checked regularly to ensure that they are not blocked.**

Pascal Series pumps are designed for operation at an ambient temperature between 53°F and 104°F (12 and 40°C) (with A120 oil).

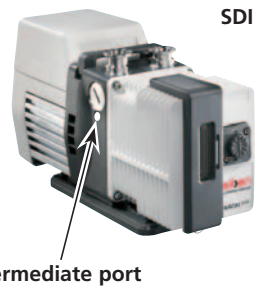
## Inlet and exhaust fittings

**⚠ WARNING**

- **Do not expose any part of the human body to vacuum.**
  **The product is supplied with the inlet and exhaust sealed. Remove these blanking plates when you are ready to connect the product on your vacuum system.**
  **As well as, don't operate the product unless the inlet and exhaust are connected to a vacuum and exhaust pumping line.**

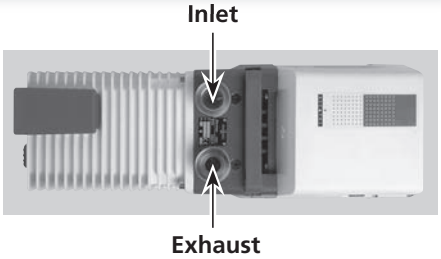
***At inlet:***

- **Make sure that the parts or chambers connected to the inlet of our pumps products withstand a negative pressure of 1 bar in relation to the atmospheric pressure.**
- **The inlet pressure must be no higher than atmospheric pressure. Too high pressure can damage the product.**




The pump inlet and exhaust orifices are equipped with **DN 25 ISO-KF end fittings** which can be used to fit various line components made of stainless steel, plastic, etc. (***see the adixen catalog***).

The intermediate port connection on SDI model is 1/8 Gas female.



# Mechanical connections (cont'd)

## Inlet and exhaust fitting (cont'd)

**⚠ WARNING**

*At exhaust:*

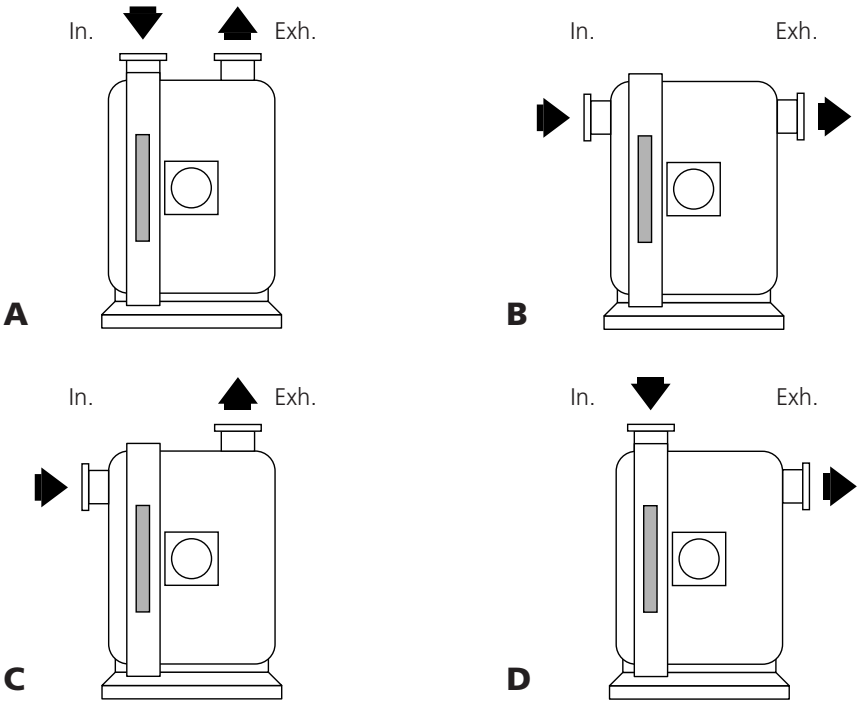
- **When pumping on corrosive, aggressive or flammable gases, the gas can cause injury or death. In these cases,**
  - **connect the exhaust of the pump to an exhaust stack or an evacuation duct.**
  - **connect a relief valve or rupture disc directly on the pump. Contact your closest service center (see addresses at the back of the operating manual).**

  **When the exhaust is connected to an extraction duct or an oil mist eliminator, you must remove the exhaust safety valve mounted in the pump's exhaust orifice.**
- **Make sure the exhaust excess pressure does not exceed 0.5 bar (relativ). Too high a pressure can damage the product.**
  **Check periodically that the pipes and accessories (i.e. oil mist eliminator) connected at exhaust are not clogged and that the purge is running (Series C1, C2).**

**After connecting the product to the pumping line, check for leaks along the whole of the line to ensure proper connections have been made (pump, pipes, valves, etc.).**

## Changing position of inlet and exhaust fittings

Depending on the types of accessories used and the pumping conditions, these orifices can be fitted vertically on the pump or horizontally as shown on the diagram below.
**Note:** The pump is supplied in configuration **A**.

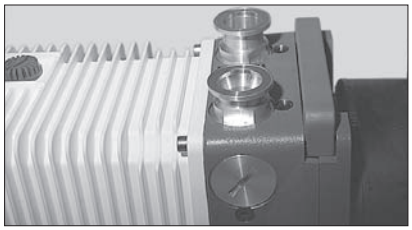


## Changing position of inlet and exhaust fittings (cont'd)

**Disassembling the fittings**

4 Unfasten the attachment screw from the end fitting to be removed.

30 Unfasten the end fitting and remove it from its housing along with the O-ring. In the case of the inlet end fitting, also remove the inlet filter.



**Horizontal reassembly**

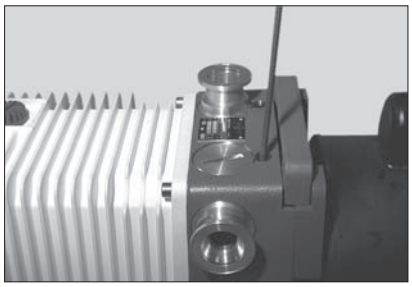
4 Remove the attachment screw from the lateral cap and using a wide screwdriver, remove the cap.

- Position the end fitting in the corresponding lateral orifice taking care to fit the O-ring.

Attach the end fitting with the screw.

In the case of the inlet end fitting, fit the filter at the bottom of the orifice.

- Close unused orifices with plugs and fasten the screws.



# Electrical connections

**⚠ WARNING**

- **Ensure that the product is connected to an electrical installation:**
  **- in compliance with the local and national safety requirements,**
  **- equipped with electrical protection (fuses, circuit breaker, ...) which has a suitable earth (ground) point, properly connected.**
- **Our products are designed to comply with current EEC regulations. Users making their own modifications to the product are liable to break its compliance with these regulations, degrade its EMC (electromagnetic compatibility) rating, and make it unsafe to use. The manufacturer declines all liability for the consequences of such operations.**
- **Electric shock hazard.**
  **The voltages and currents in use can induce electric shock.**
  **Isolate and lock out power line to the product before maintaining it /or removing the cover.**
  **Only skilled, authorized people may carry out maintenance work.**
  **If a main isolator is installed by the customer, it must be in compliance with local regulations, with a minimum interrupting short circuit current of 10kA.**
- **Check that the electrical wiring and the voltage selector position of the motor corresponds to the line voltage, before starting up the pump.**

## External motor protection

The information below is given as a recommendation.

The user must comply with the electrical standards or recommendations (IEC, VDE, UL, CSA, etc.) applicable in the country in which the pump is used.

The use of electrical protection for the pump motor makes it possible to protect:

– The motor: in the event of excess voltage or rotor blocking, the resulting excess current may destroy the coil and possibly the start-up system (for a single-phase motor).

– The pump: in the event of a lubrication fault (contaminated oil, presence of particles), increased resistance will draw excessive motor current.

Differential thermal circuit-breakers should be used, in which the mechanism contains an instantaneous disconnection controlled by a bi-metal blade.

**CAUTION**

**Differential circuit breaker.**
**In case of insulation defect, for personnel protection you must install on the main power supply a type B differential circuit breaker GFI (or RCD) of 30 mA minimum.**
**This equipment protection device is compatible with type T.T electrical network.**
**For other network type T.N or I.T, apply the right protection device. Contact adixen product manufacturer for advice.**
**In all cases, comply with current local regulations.**

**◗ single-phase motor:**

The table on the following (***see page 27***) gives the characteristics at start-up (for temperatures ≥ 12°C) and in permanent operation.

In this table, you will find, for each pump, a standard fuse or motor-associated value.

**◗ three-phase motor:**

The table on the following (***see page 27***) gives, for each pump, the electrical characteristics in permanent operation and the proposed circuit breaker.

## Three-phase version

Electrical motor is in accordance with major international standards (UL, CSA, CE) and offers two voltage ranges:
– Low voltage: 200-230V at 50 Hz and 200-280V at 60 Hz
– High voltage: 380-415V at 50 Hz and 480V at 60 Hz

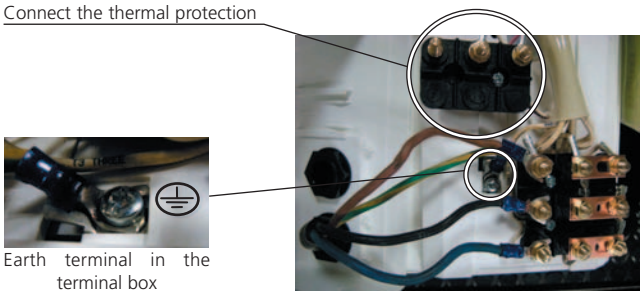
**The three phase motor (protection level IP 43. TEFC type) must be protected by a customer supplied starter consisting of a suitably rated contactor (*see page 27*). Furthermore, it is equipped with a dry contact (NC) thermal protection which is available in the terminal box.**

### Three-phase motor power supply

Three phase motor wiring is at the customer's charge.
Wire the motor according to the line voltage. The connections to be made are shown on a diagram inside the terminal box or on its cover (***see page 25***).

Connect a mains cable using wire section of 1.5 $mm^2$ (AWG-16) to the power supply connector. Ensure that the electrical supply cable is suitably protected against earth defects and that the earth wire is longer than the three conducting wires.

Connect the earth wire to the earth terminal marked IEC 417#5019 ⏚.



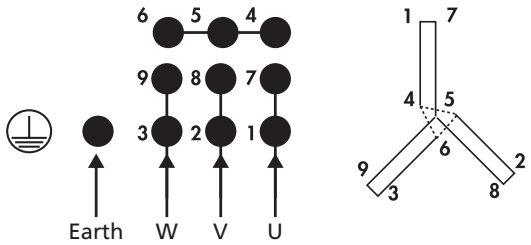

Earth terminal in the terminal box

### Electrical connections

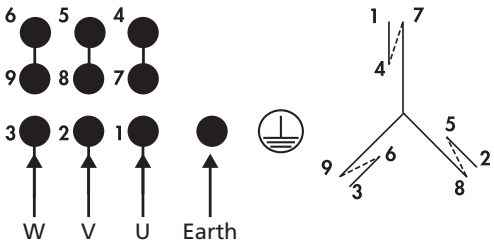
The pumps are equipped with 9 wire terminal box motors, the wiring diagram of the terminals is given as a rough guide only. In the event of doubt, only the plate in the terminal box should be used as a reference.

### Terminal box (9 wires)

**LOW VOLTAGE CONNECTION**
**200-230V 50 Hz – 200-280V 60 Hz**
**Parallel coupling**




**HIGH VOLTAGE CONNECTION**
**380-415V 50 Hz – 480V 60 Hz**
**Serial coupling**




**⚠ WARNING**

- **Motor rotation is defined by main power connection. Uncorrect wiring may cause backwards pump rotating. Check rotation sense at first start up.**
- **In the three phase electrical installation, the customer must provide a circuit breaker, used as main supply interrupting device for all conducting wires, easily accessible by an operator and visibly marked as a electrical interrupting device of the product.**

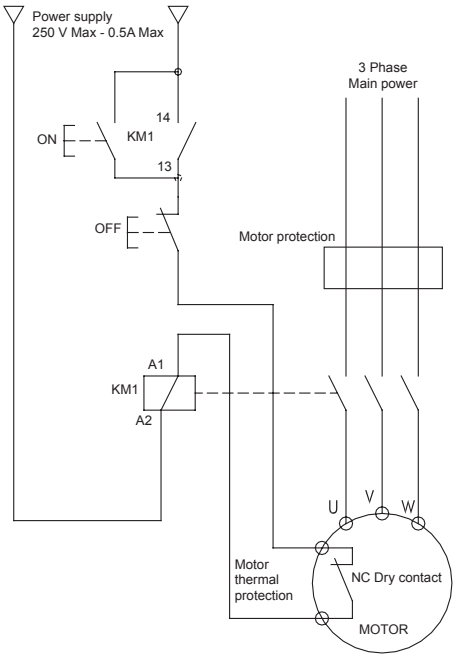
# Electrical connections (cont'd)

## Three-phase version (cont'd)

### Motor Thermal protection wiring

It is necessary to protect the pump against increase of temperature.
The motors are equipped with a dry contact which gives motor temperature information.

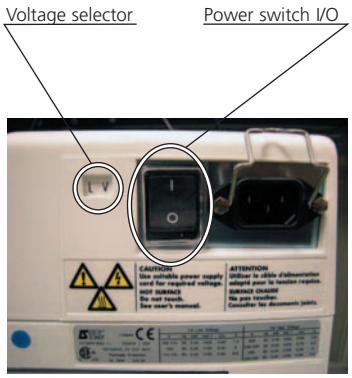
To manage the motor thermal protection, it is the user's responsibility to wire this dry contact in compliance with local safety standards: connect the 2 wires available in the terminal box according the following wiring diagram - NC dry contact - 250V max. - 0.5 A max.).




### Direction of rotation

Check the direction of rotation of the motor (direction of arrow located on the motor cover). For this:
- Remove the protective caps on the inlet and exhaust orifices.
- Fit a pressure gauge at the pump inlet.
- Switch on the pump for 2 to 3 seconds, than stop the pump.
- If the pressure indicated is less than $5.10^{-1}$ mbar, the direction of rotation is correct.
- If the pressure increases, invert two phases.

## Single-phase version




Electrical motor is certified with major international standards (UL, CSA, CE) and offers two voltage ranges:
- Low voltage: 100-110 V at 50 Hz and 100-120 V at 60Hz
- High voltage: 200-230 V at 50 Hz and 200-230 V at 60 Hz

**The single-phase motor is delivered with a power cable from 2 m length. It is equipped with an I/O power switch ('I' motor switched ON, 'O' motor switched OFF) and a voltage selector accessible inside the motor cover (*see page 26 for voltage change*).**

**The single-phase motor (protection level IP 43. TEFC type) must be protected by a customer supplied starter consisting of a suitably rated (*see page 27*).**

Before connecting to the mains, check the position of the voltage selector.
High Voltage (HV) or Low Voltage (LV) corresponds to the line voltage.
**The plug is equipped with a ground pin which must be connected.**
The motor rotation direction is set at the factory.

**⚠ WARNING**

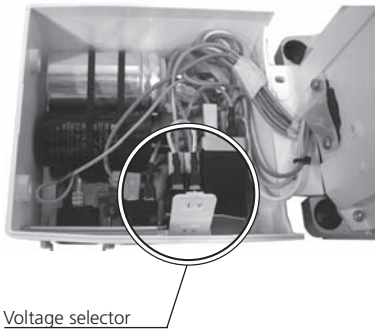
**The power cable is the electrical power switch, so it must be easily accessible by an operator during product use.**

### Specific internal protection

Single-phase motors have a thermal circuit switch with automatic starting device (CSA standard): when the internal motor temperature reaches a value over the preset limit value, the motor stops. However, when the motor is cooled, it will start-up again automatically.

## Single-phase version (cont'd)

### Voltage range change




The voltage range can be read beside the motor switch: the dual frequency single-phase motor can be configured for low voltage (LV) or high voltage (HV).

To change this type of connection, proceed as follows:
– make sure that the motor is not switched on, and the power cord is removed,
– unfasten the 4 attachment screws on the motor upper cover and tip it up,
– remove the voltage selector cover marked with the voltage, press on the voltage selector (position II).
– invert the position of the voltage selector cover in order to show the other voltage at the outside of the motor cover: "HV" for high voltages, or "LV" for low voltages. Check to be sure that the voltage selector has fully latched the rocket switch when the voltage selector cover is replaced.
– install the upper cover and refasten the 4 screws.
– secure the upper cover as follows:
  • Center it on the front motor flange,
  • Close the upper cover,
  • Install and tighten the 4 screws, starting installing the screws on the pump handle side first.

## Other type of motor

In example: explosion proof motor. Refer to the electrical rating label and the manufacturer's specifications.

## Summary tables of various types of motors

The characteristics and ratings of fuses and circuit breaker associated with standard pump motors, 5 to 21 $m^3/h$, single-phase or three-phase.

**⚠ CAUTION**

**Installation protection with circuit breaker.**
**The user must supply the pump from facilities equipped with a main circuit breaker, curve D (IEC 60947-2), in accordance with local regulations and with a minimum interrupting short circuit current of 10 kA.**
**This protection device should be in close proximity to the pump (no further than 7m (25 ft) within line of sight of the pump).**

### Single-phase motor

| Voltage/ Frequency | Current at ultimate pressure (A) | *Start-up current (A) | Proposed fuse protection (A) | | Maximum power (VA) |
|---|---|---|---|---|---|
| | | | Standard | Type aM** | |
| 100 V 50 Hz | 5 | 30 | 20 | 8 | 740 |
| 100 V 60 Hz | 3.5 | 34 | 20 | 6 | 580 |
| 115 V 60 Hz | 4 | 35 | 20 | 6 | 580 |
| 200 V 50 Hz | 2.5 | 14 | 10 | 4 | 870 |
| 200 V 60 Hz | 2 | 19 | 16 | 4 | 650 |
| 220 V 60 Hz | 2 | 20 | 16 | 4 | 650 |
| 230 V 50 Hz | 3 | 8 | 10 | 4 | 870 |

* Temperature = 12°C
** aM : Motor-associated type fuse

### Three-phase motor

| Voltage/Frequency | *Start-up current (A) | Proposed circuit breaker protection (A) | Maximum power (VA) |
|---|---|---|---|
| **Low voltage** | | | |
| 200 V 50 Hz | 3 | 4 | 1027 |
| 200 V 60 Hz | 2.6 | 3.5 | 871 |
| 230 V 50 Hz | 3.6 | 4.5 | 1450 |
| 253 V 50 Hz | 4.7 | 5 | 2090 |
| 280 V 60 Hz | 3.8 | 4.5 | 1829 |
| **High voltage** | | | |
| 380 V 50 Hz | 1.5 | 2 | 860 |
| 415 V 50 Hz | 1.6 | 2 | 1040 |
| 480 V 60 Hz | 1.6 | 2 | 1022 |

* ..... Temperature = 12°C

# Operation

## Preliminary precautions

**⚠ WARNING**

- **The performance and operational safety of this product are guaranteed provided it is used normally in the operating conditions defined in this operating manual.**
  **It is the customer's task to:**
  **- train operators to use the product if they do not speak the language the operating manual is written in,**
  **- ensure operators know the safe practices to apply when using the product.**
- **Fire protection.**
  **The roughing pump is not intented to be installed on process containing flammable materials or in hazardous atmosphere.**
- **Fire hazard due to the presence of electrical components.**
  **The fire hazard is low due to the use of appropriated components and the containment in the pump cover.**
- **The vacuum pump is also a compressor: incorrect use may be dangerous. Study the operating manual before starting up the pump.**

- **The products are designed to avoid subjecting users to heat hazards. However, specific operating conditions may exist that require extra caution from users due to the high temperatures generated (outer surfaces > 70° C). Wear protective gloves and leave the pump to cool before working on the product.**
- **The products are factory tested to ensure they will not leak in normal operating conditions. It is the user's responsibility to ensure this level of leak tightness is maintained.**
- **For emergencies and breakdowns, contact the manager of your local service center (see addresses at back of operating instructions).**

## Operating temperature

**At start-up**, before switching on the motor, check that the oil bath temperature is greater than 53°F (12°C).

**The ambient operating temperature** for the pump must be between 53°F (12°C) and 104°F (40°C).

Under these conditions, **the stabilized pump temperature** (at the front of the oil case) will be between 140°F and 158°F (60 and 70°C) (with A120 oil, depending on operating conditions).

**Special case - Synthetic oils**

Synthetic oils are much more viscous when cold than mineral oils.

Do not start up the pump at ambient temperatures below 59°F (15°C).

The stabilized temperature is higher than with a pump used with mineral oil.

For the same reason and to facilitate lubrication of the pump, pour a few drops of oil (1 to 2 $cm^3$) through the inlet orifice before starting.

# Operation (cont'd)

## Before starting-up the pump

**⚠ CAUTION**

**Check that the exhaust pipes are not clogged (i.e. oil mist eliminator) and the purge is running.**

## Start-up

• When using a three phase motor, **check the direction of rotation of the motor** (***see page 26***).

• **Check the oil level** (***see page 20***).

• **Connect the pump inlet to the vacuum container.**

• **Start-up the pump: power switch on 'I' position (single-phase motor), or swith on the customer power device.**

• **Allow the pump to run for one hour with the inlet blocked at ultimate vacuum:**

During this operation, make sure that the oil circuit is operating. Remove one of the oil fill plugs to listen to the pump.

At start-up, the oil enters the lubrication circuit of the vacuum pump. As a result, noises will be heard (first irregularly, then regularly) which will reduce as the oil heats up. These noises will no longer be heard when the fill plug has been replaced.

Under normal temperature conditions, the oil circuit should start less than 1 minute after start-up (this time may vary with the type of oil and its degree of contamination).

It is normal for the oil level to rise (*as can be seen through the oil sight glass*) when the pump is hot due to expansion of the oil and starting or the oil circuit.

In the event of a malfunction, refer to the "Troubleshooting and corrective actions" table (***page 40***).

## Cold start-up

When a pump must start cold (ambient temperature < 12 °C) or when it has to start cold after pumping contaminating products or condensable, the current after start-up may remain high until the oil in the pump is heated up.

These conditions are sufficient for the internal thermal protection to be activated, making start-up impossible.

For the same reasons, the current after start up may remain high and incompatible with the motor external electrical safety (***see table page 27***).

We advise to increase the ambient temperature and wait for pump warming (***see troubleshooting and corrective actions page 40***).

To make the pump start up easier, we recommend to proceed as follows:

- Connect the pump exhaust to an evacuation duct.
- Put the pump at atmospheric pressure and start it up. Oil circuit starts operation: it can take 2 to 3 minutes.
- Then, close the inlet port and wait for 15 minutes that the oil circulation works correctly.
- Then connect the inlet port to the pumping line.

## SDI Models

As this pump will be integrated into the customer application, its use will depend on the process.

**Start up**

- Connect the pump inlet to the vacuum container, the exhaust to an oil mist eliminator, and the intermediate inlet port to the sensor gas line. Check that an electrovalve is installed on the gas line.
- Start up the pump: power switch on 'I' position (single-phase motor), or swith on the customer power device.
- Allow the pump to run for one hour at ultimate pressure with the inlet blocked.
- When the inlet requested pressure is reached, pump via the intermediate inlet port.

The pumping speed at the intermediate port depends on the inlet pressure: when this last increases, the pumping speed at intermediate port decreases.

**⚠ CAUTION**

- **When the intermediate port is used, the pump is not tight when stopped! To guarantee this tightness, install an electrovalve in the pumping line (customer supply).**
- **When the intermediate port and the gas ballast are used simultaneously, the ultimate pressure at intermediate port is damaged due to the pressure increase: the pump ultimate pressure corresponds to ultimate pressure with gas ballast open.**

## Pump stop

**SDI model**

Before switching off the pump, stop the tracer gas pumping on the intermediate port.

**All models**

Put the motor switch on «0» position (single phase motor) or press the circuit breaker of the customer's installation (three phase motor).

# Operation of gas ballast

## Regeneration of pump oil

In a pump stored with the same oil for a long time, condensed vapours may contaminate the oil bath and affect performance. This is also the case after pumping vapours and when the oil appears cloudy or discolored through the sight glass.

- Run the pump, shutting it off from the system at the inlet by a valve or a plug. We advise to connect the exhaust of the pump to an evacuation duct, or an oil mist eliminator.
- Open the gas ballast and allow the pump to operate for 1/2 hour to 1 hour, or longer if the oil remains cloudy. This operation accelerates the temperature rise of the pump while eliminating residual vapours present in the oil bath.

## Pumping condensable vapours

To pump with condensable products, it is necessary to operate with a hot pump. For this, isolate the pump from the system and allow it to operate for 1/2 hour with the gas ballast open, or 1 hour (if possible) with the gas ballast closed. When the oil bath is hot, the condensation of vapours in the pump is reduced or prevented.

### Choice of pump and system

The pump's capacity to eliminate condensable vapours is related to their type, the pump temperature and the quantity of air introduced by the gas ballast.

Care should be taken to limit the inlet pressure of the pump to its maximum admissible water vapor pressure with the pumped product. This is obtained by reading the pump characteristic table for water vapour (***see page 9 and 10***).

The use of cold traps or condensers are recommended when large quantities of vapours are to be extracted.
**Caution: don't forget to regenerate the traps. Excessively intense or prolonged pumping may cause the products condensed in the trap to be evaporated a second time.**

### Choice of oil

Choose an oil which facilitates the separation of pumped products which may be condensed in the oil bath (anti-emulsion oil for water-based compounds, etc.) (***see page 18***).

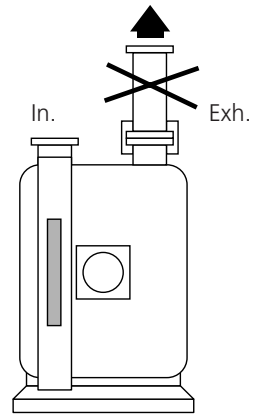
### Assembly

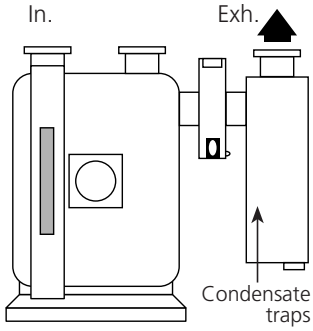
The condensation of vapours at the pump exhaust is reduced if:

- The pump and oil temperature are high.
- The pressure at the exhaust is as low as possible (removal of the oil mist eliminator and connection to an evacuation duct...).
- The condensates are collected separately from the oil bath and do not block the exhaust duct.

For this:

- Avoid using any vertical ducting which promotes the condensation of products and the return of these products to the pump.
- Use a condensate collector.
- We do not recommend an oil mist eliminator when pumping condensable vapors: if it is essential, do not connect it directly to the pump exhaust but place it outside the condensation zone.
- Remove the stop valve from the pump exhaust (*I, SD, SDI series*).
- If possible, connect the exhaust to a mechanical device creating a negative pressure from 0.1 to 0.2 bar.



## Pumping condensable vapours (cont'd)

**Operating mode**

- Isolate the pump from the system and increase the pump temperature, 30 minutes with gas ballast (***see page 30***).
- Start pumping and check the oil level:
  - The oil level drops, oil is being lost, add oil in the pump.
  - The oil level rises; condensates have been added into the oil.
- After pumping, let the pump running at ultimate pressure and condensates will be separate from the oil.
  - If the oil is cloudy or discoloured, change the oil.
  - If the condendates are heavier than the oil, drain them by the oil drain port.
  - If the condensates are lighter than the oil, drain the pump, flush the pump with clean oil. Let the mixture to clarify, than recover the oil.

# Purges for pumping condensable, corrosive, and hazardous gases

## Purge description

The use of vane pumps may result in pumping gases or vapors which are flammable or that could contaminate the oil. In this case, these products must be diluted using purges supplied with dry gases, such as nitrogen to avoid undesirable reactions.

These purges can be located at the pump inlet (pumped gas dilution), but also at the gas ballast (condensable product pumping), at the bubbler (oil degasing), or on the oil casing (oil casing and exhaust pipe flushing).

**Purge characteristics**

For this purpose, a filtered dry nitrogen supply or other inert gas with the same characteristics is required:
- condensation point < 72°F/22°C,
- dust < 1µm,
- minimum absolute pressure 2 bar,
- $H_2O$ concentration < 10 ppb,
- $O_2$ concentration < 5 ppb.

**CAUTION**

**When two purges are used simultaneously, the gas flow rates are added: Take the following points into account:**
- **The use of these purges musn't create a relative overpressure above 0.5 bar at the pump exhaust.**
- **The simultaneous use must not generate oil loss.**
- **The gas flow must be sufficient to allow the right operation.**

**Oil casing purges (all models)**

The purge dilutes pumped gases with a neutral gas.
It makes it possible to limit corrosion in the oil case, condensation and accumulation of gases in dead spaces of the pump.
Furthermore, the purge allows to flush with gas the pipes and accessories connected at the exhaust of the pump.

Connect the nitrogen supply to one of the unused filling plugs on the oil case (BSPP 1/8 Gas connection).

Set the nitrogen pressure to approximately 15.4 PSIG (1.1 absolute bar) (***see table next page***), and the flowrate so as to satisfy the dilution conditions.
(Caution: do not generate an overpressure > 7 PSIG (0.5 relative bar).

**Purge with gas ballast (I, SD, SDI, C1 models)**

It is possible to connect a gas line on the gas ballast on the oil case feedthrough (female connection 1/8 Gas).

Adjust the neutral gas flow rate according to the indicative values from **page 35**.

**Note :** To make this connection, remove parts 53-54-55-57 and 58 from the gas ballast (***see page N - 5***).

**CAUTION**

**In this case, the manufacturer does not guarantee the pump tightness and would not be responsible of any incurred risks. It is the user's responsibility to take the appropriate measures for the operator's safety.**

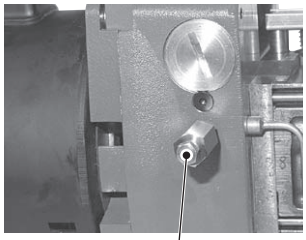
**Purge with gas ballast (C2 model)**

Because of the danger present if the gas ballast was to be opened to astmosphere (C2 series), the manual gas ballast doesn't operate.
Connect the dry nitrogen on the specific connector (1/8 Gaz).

The nitrogen flowrate should be adjusted according to the values from table ***page 35***.

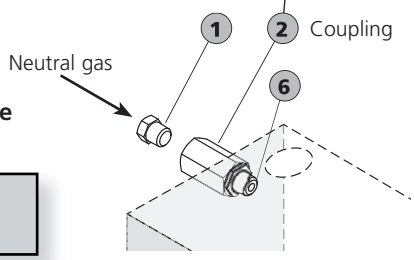
**Purge with bubbler (C2 model)**

The bubble device is composed of an air tube with several holes, located at the bottom of the oil case, which releases bubbles of neutral gas in the oil. In this way, the oil is saturated with neutral gas, which reduces its capacity to dissolve pumped gases. The bubbles of neutral gas released make it possible to eliminate the volatile vapours or acids condensed in the oil. The bubbler flow also lowers the pumps temperature which slows corrosion.



**Neutral gas supply connecting to the bubbler**

Remove the plug (**1**).
At this place connect in the coupling (**2**), the neutral gas supply (NPT 1/8 Gas connection ), **without unscrewing the coupling (2) and the connector (6)**.




**⚠ CAUTION**

**Never unscrew the coupling (2) and the connector (6) from the housing.**

## Flow and pressure purge setting values

| Purge type | Unit | Injection | | | |
|---|---|---|---|---|---|
| | | At inlet (2) | on gas ballast | on bubbler | on oil casing |
| Maximal pressure (1) | relative mbar | from 100 to 300 | 100 | from 50 to 100 | 100 |
| Maximum flow (1) | l/h | Versus flushing conditions | from 900 to 1000 | from 60 to 500 | from 50 to 300 |

**Note (1):** These characteristics apply for pumps operating at constant inlet pressure (1 to 5 mbar). They may be adapted to the pumping conditions and the settings are customer's responsibility. If necessary, contact us.

**Note (2):** In case of purge installed at the inlet of the pump, install a jet on the inlet piping line (customer supplied). Purge flow will depend on the jet diameter. Never connect a neutral gas bottle directly at the pump inlet: pump inlet pressure must remain the atmospheric pressure.

## Operation principle

**Start-up**

Isolate the pump from the pumping line (*close the isolation valve at inlet*).
Start up the pump at ultimate vacuum. When it is hot, open the nitrogen purge and adjust the flow.
Wait for the pump stabilization.
Open the inlet valve and pump on corrosive gases: check that the purge in running during all the pumping time.

**Stop**

Isolate the pump from the pumping line (*close the isolation valve*).
When pumping stops, allow the purge to operate for approximately 1 hour (*depending on the quantity of pumped gas*) at ultimate vacuum, with the purge, in order to degas the oil effectively and clean the pump with nitrogen to eliminate the traces of pumped gases.
Stop the purge but let the pump running to avoid any condensation, or dampness introduction that can react with pumped gases.
If the pump must be stopped, prepare it as described **on page 16** to store a pump which has been used.

# Oxygen pumping

In certain applications, mixtures containing oxygen at different concentrations, or even pure oxygen, are used.

Oils of mineral origin are combustible. Exposure to pure oxygen at high temperatures may cause them to self-ignite. In addition, they are highly oxidized during pumping and quickly lose their lubricating properties.

Mineral oils must not be used for oxygen levels of over 21 % in pumped gases. In this case, perfluorinated synthetic oils must be used (***see page 18***).

The use of these oils requires a special pump preparation (***see page 45***). The pump must be completely disassembled and all traces oil mineral oil removed. Flushing the oil case is not adequate.

**⚠ DANGER**

**It is strongly recommended not to use fluids such as tri-aryl-phosphate-ester which are known to cause accidents.**

Any accumulation of oxygen in the installation should be avoided and the oxygen or combustible mixture should be diluted with a neutral gas at the exhaust: the gas flow rate should be 4 times the oxygen flow rate.

**Certain combustible or explosive gases require a higher degree of dilution. Our Support Services and Customer Services can advise you to help solve problems of this kind.**

# Recovery of oil (high pressure and cycling)

When the pump operates at high pressure, the oil heats up, becomes more fluid and is flushed out of the functional block by the gas stream. Oil losses at the exhaust are increased.

## For intermittent pumping

The use of a oil mist eliminator prevents losses due to intermittent high pressure operation. If the pump only operates for a very short time at high pressure, the lubricating oil is replaced when the pump returns to low pressure.

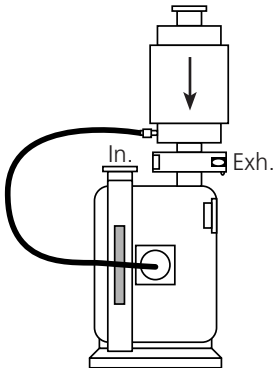
## For cyclical pumping or continuous pumping at high pressure

If the pump operates at high pressure in a cyclical fashion, oil consumption may reach sufficiently high levels (according to the pumped volume and pumping cycle rates) causing the level to drop in the oil case.

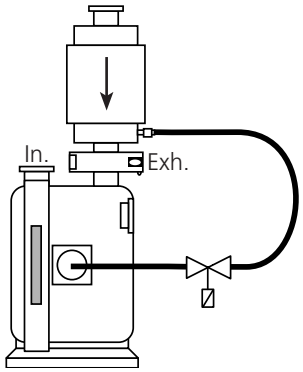
There is then a risk of seizure due to a lack of oil. In addition, the high flow of gas passing through the eliminator prevents oil from returning to the oil case.

In order to pump in these conditions, the pump must be equipped with an oil mist eliminator and an oil draining kit, which enables oil recovery via the gas ballast (***see accessories page 12***).
**In case of oil recovery via the pump inlet port, consult us.**

**Example:**
**OME 25HP oil mist eliminator with ODK oil recovery device (via gas ballast).**




**⚠ OME 25 HP + ODK 1**
**Device is not tight when switched off.**




**OME 25 HP + ODK 2**
**An electrovalve activated by the pump stop ensures tightness when switched off.**

# Safety instructions for maintenance

## General precautions

For normal operation, the maintenance of 5 to 21 $m^3/h$ series pumps only require regular oil changes (***see page 43***).

**⚠ WARNING**

**Maintenance must be performed by a skilled maintenance operator trained in the relevant health and safety aspects (EMC, electrical hazards, chemical pollution, etc.).**
**Isolate the product from all energy sources (mains electricity, compressed air, etc.) before starting work.**

**⚠ DANGER**

- **Certain gases can become corrosive and toxic after decomposing when trapped in oil. Always wear protective gloves when handling used and dirty pump oil, drain it into a closable container, and do not breathe the oil fumes. Always use fully self-contained breathing apparatus.**
- **During pump removal, draining or maintenance operator could be in contact with process residues which could cause severe injury or death. Ask your safety department for instructions according to the local regulations.**

**We recommend to:**
**- To purge the pumping installation with dry nitrogen.**
**- Wear gloves, protective glasses, breathing mask or any appropriated safety equipment.**
**- Ventilate the premises well.**
**- Do not eliminate maintenance waste via standard disposal channels. Have it destroyed by a qualified company if necessary.**
**- Install the inlet and exhaust blanking plates, thus accessories are delivered with the pump.**

- **Decontamination – product dismantling**
  **According to the regulations 2002/96/CE about Waste of electrical and electronical equipments, and 2002/95/CE about Restriction of Hazardous substances, the manufacturer provides a recycling paid service for the end of-life of waste electrical and electronic equipment.**
  **Any obligation of the manufacturer to take back such equipment shall apply only to complete not amended or modified equipment, using adixen Vacuum Products original spare parts, delivered by adixen Vacuum Products, containing i.e. all its components and sub-assemblies.**
  **This obligation will not cover the shipping cost to an adixen take back facility.**
- **If you return the product to an adixen repair service center, please make sure you follow the «procedure for returning products» and fill in the declaration of contamination found at the end of the operating manual or on the web site.**

**⚠ WARNING**

**Insufficient tightness after servicing could result in chemical hazards. Always perform a leak test after maintenance.**

# Troubleshooting and corrective actions

| Incidents | Causes | Corrective actions |
|---|---|---|
| **The pump is not running** | ▶ Incorrect motor power supply. | Check the power supply. |
| | ▶ Oil temperature too low. | Reheat the pump and its oil (***see cold start-up, page 30***). |
| | ▶ Gumming of seals after prolonged storage. | Disassemble the motor and try to turn the fan manually.<br>Disassemble, clean the pump, replace seals, reassemble. |
| | ▶ Oil contaminated after pumping. | Drain, flush and refill with clean oil. |
| | ▶ Motor coupling damaged. | Replace by disassembling the motor. |
| | ▶ Pump seized, due to a stopping after pumping in difficult conditions (no draining or flushing). | Disassemble, clean, hone the scratched metal parts (replace them if necessary) and reassemble. |
| **The pump does not start** | ▶ Oil cold. | Warm pump. |
| | ▶ Insufficient oil in the oil case. | Fill up to the level. |
| | ▶ Oil contaminated. | Drain, flush and refill with clean oil. |
| | ▶ Oil pump inlet partially blocked. | Drain, and clean the oil pump inlet duct. |
| | ▶ Lubrication holes blocked. | Disassemble and clean. |
| | ▶ Vane or spinner-cam (SD models) damaged. | Replace them. |
| | ▶ Incorrect anti-suckback system assembly. | Repeat the assembly and the setting. |
| **The vacuum pump does not produce a vacuum** | **Ultimate pressure obtained: a few mbar, Torr** | |
| | ▶ Direction of motor rotation incorrect (three phase). | Rewire. |
| | ▶ Insufficient motor power. | Check the power supply. |
| | ▶ Inlet filter blocked. | Clean it. |
| | ▶ Insufficient oil in the oil case. | Add oil. |
| | ▶ Oil cold, oil pump inlet blocked. | Warm, disassemble, clean. |
| | ▶ Oil contaminated. | Drain, flush and start again with clean oil. |
| | ▶ Oil pump inlet partially blocked. | Drain and clean the oil pump inlet duct. |
| | ▶ One of the LP safety valves is damaged. | Replace. |
| | ▶ Part forgotten in reassembly. | Repeat the reassembly. |

| Incidents | Causes | Corrective actions |
|---|---|---|
| **The vacuum pump does not produce a vacuum (*continued*)** | **Ultimate pressure obtained: a few $10^{-2}$ Torr ($10^{-2}$ mbar)** | |
| | ▶ Gas ballast adjustment button open. | Close. |
| | ▶ O-ring pinched. | Replace. |
| | ▶ One of the seals is damaged. | Replace. |
| | ▶ One of the HP safety valves is damaged. | Replace. |
| | ▶ Lubrication holes blocked. | Disassemble and clean. |
| | ▶ Incorrect anti-suckback assembly. | Repeat the assembly and setting. |
| | ▶ Part forgotten in reassembly. | Repeat the reassembly. |
| | **Accessories** | |
| | ▶ At the pump exhaust, the installation produces an exhaust pressure of 1,125 Torr (1.5 bar). | Check the installation. |
| | ▶ Oil mist eliminator cartridge clogged. | Replace. |
| **Noisy pump** | ▶ Oil level too high. | Drain and fill with a new oil. |
| | ▶ Oil contaminated (presence of particles). | Drain, flush and refill with clean oil. |
| | ▶ Pump not prepared for the oil used. | Check the pump configuration or the type of oil. |
| | ▶ Incorrect motor power supply. | Check the power supply. |
| | ▶ Motor bearings damaged. | Replace the motor after inspection. |
| | ▶ Motor coupling incorrectly set or damaged. | Check the setting. |
| | ▶ Incorrect fan assembly. | Check the assembly. |
| | ▶ Incorrect anti-suckback device assembly. | Repeat the assembly. |
| | ▶ Vanes damaged or stuck. | Replace. |
| **Pump too hot** | ▶ Ambient temperature too high. | Ventilate the pump. |
| | ▶ Pump placed in a poorly ventilated place or vents blocked. | Check the installation (***see page 21***). |
| | ▶ Operation at high pressure P > 22 Torr (30 mbar). | Use an oil recovery device, ventilate the pump. |
| | ▶ Excess pressure at exhaust. | Check the exhaust line. |
| | ▶ Motor in over-voltage or motor in short-circuit. | Check the voltage, replace the motor. |

# Troubleshooting and corrective actions (cont'd)

| Incidents | Causes | Corrective actions |
|---|---|---|
| **Pump too hot (cont'd)** | ▶ Oil contaminated. | Drain, flush and refill with clean oil. |
| | ▶ Pump not prepared for the oil used or oil unsuitable. | Check pump configuration or type of oil. |
| **Considerable oil losses** | ▶ Oil level too high. | Drain and fill with new oil. |
| | ▶ Operation at high pressure. | Use an HP type oil mist eliminator with oil recovery. |
| | ▶ Gas ballast open:<br>1 - accidentally,<br>2 - pumping of condensable vapours. | 1 - Close.<br>2 - Use a condensate collector. |
| | ▶ Leak at oil case seal or at front seal. | Check the assembly and replace the seals if necessary. |
| **Poor pump tightness when switched off** | ▶ Gas ballast open. | Close. |
| | ▶ Safety valve damaged. | Replace. |
| | ▶ Incorrect anti-suckback assembly. | Repeat the assembly. |
| | ▶ O-ring pinched. | Replace. |
| | ▶ Seals damaged. | Replace. |
| | ▶ Oil contaminated. | Drain, flush and refill with clean oil. |
| **Oil in plate** | ▶ Oil case and frame cleaned poorly during reassembly. | Remove the base and clean. |
| | ▶ Oil case seal pinched. | Disassemble the oil case, clean the faces and refit a new seal. |
| | ▶ Front seal damaged or felt saturated. | Replace. |

# Maintenance

## Maintenance frequency

| | Frequency | Operating conditions |
|---|---|---|
| **Oil** | **6 months** | "normal", 24 / 24h |
| | **1 year** | "normal", < 12h / day |
| **Pump** | **1 year** | "normal", 24 / 24h |
| | **2 years** | "normal", < 12h / day |

The frequency values are minimum values for «normal» operating conditions: pressure < 1 mbar (0.75 Torr), clean gas and non-corrosive gas.

**An incorrect ultimate vacuum or a reduction in pumping speed are signs that the oil has deteriorated.**

The periodic inspection of the state of the oil is performed by comparison with a sample of new oil in order to check the level of contamination or deterioration of the lubricant.

The frequency at which oil is renewed is adapted to the type of operation:

- If the oil is cloudy, this indicates that condensables have been absorbed during pumping. The oil can be regenerated using the gas ballast (***see page 32***).
- A thickening of the oil, together with a blackish color and a "burnt" smell indicate that the oil has deteriorated. Drain the pump and flush it.

When the lubricating oil is expensive (fluorocarbon synthetic oils), the use of an oil mist eliminator allows oil recovery after deposition.

T**he oil should be changed every 6 months. This value is given as a guide only.** It may be extended to 1 year if the ultimate vacuum required is sufficient (for primary vacuum pumps). Similarly, **if the pump is stopped frequently for long periods, the oil should be changed at intervals of 6 months to a maximum of 1 year** (oil may become sticky).

**Note:** Every pumping operation is different. This oil must therefore be changed at intervals adapted to each specific application. The use of accessories (***see page 12***) can reduce the frequency of these maintenance operations.

## Maintenance of the accessories

When an adixen accessory is connected to the pump, periodically it is necessary to make accessory overhaul.
Study the accessory operating instructions and make sure you follow the safety instructions it gives regarding protection of personnel.

Ask your safety department for instructions according to the local regulations (***see page 39***). Safety instructions also apply to accessories.

**⚠ WARNING**

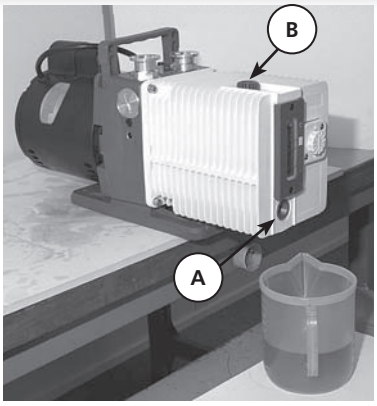
**When an oil mist eliminator is installed, check periodically at the exhaust orifice that:**
**- the exhaust valve can move, so the exhaust is not blocked,**
**- the exhaust valve can move, no overpressure in the oil casing.**

# Maintenance (cont'd)

## Draining

**⚠ WARNING**

**The draining operation places the contaminated pumping circuit in communication with the outside atmosphere. Take all necessary steps to ensure personnel safety: wear gloves, breathing mask and protective glasses.**




The pump must be drained when hot and after the oil case has been vented to atmospheric pressure. For this:

- Switch off the pump.
- Isolate the pump or disconnect from the installation.
- Tilt the pump.
- Unscrew the draining plug (**A**) on the side of the oil case and the filling plug (**B**) on the top of the oil case.

When all the oil has drained, replace the two plugs temporarily and run the pump for about 10 seconds leaving the intake open. Take care with the oil mist which may appear at the exhaust. This operation removes the oil from the functional block.

- Drain this oil by removing the draining plug.
- Replace the draining plug (**A**) and fill with fresh oil to the appropriate maximum level of the oil case oil sight glass through the filling orifice (**B**) (***see page 20***).

## Flushing

The draining operation can be followed by a flushing operation if the oil is particularly dirty. This operation requires a volume of an oil half charge.

After draining the oil case, replace the draining plug. Remove the intake filter, clean it and replace it. Run the pump at atmospheric pressure, pour the flushing oil **very slowly** through the inlet orifice. Take care with oil mist which may develop at the exhaust. Stop the pump and drain the flushing oil via the draining plug. Replace the plug and fill with fresh oil (***see page 19***).

## Change of type of oil

**5 to 21 m³/h I, SD, SDI, C1** pumps are tested in the factory with **A120** oil or **A119** for USA unless specified otherwise in the order.

**5 to 21 m³/h C2** pumps are tested in the factory with **A113** oil unless specified otherwise in the order.

When the pump is delivered, a certain quantity of oil remains in the functional block. Thus, if you wish to use another type of oil, proceed as follows:

**Compatible oils**

Mineral oil can be replaced by another type of mineral oil. Simply flush the pump (***see above***) using the new oil and fill the pump (***see page 19***).
Mineral oils are also compatible with mineral-based synthetic oils ***(see page 19***).

**Incompatible oils**

This is the case when, for example, a mineral oil is replaced by a synthetic oil (e.g. A120 by A113).
Synthetic oils are considered to be incompatible with each other for practical reasons: they are expensive. A mixture may cause slight cloudiness of the resulting mixture, which could be interpreted mistakenly as a sign of contamination or deterioration.
For the same reasons, clear synthetic and mineral oils (A300), which are also expensive, are treated as synthetic oils.

These remarks apply to ester or fluorocarbon type synthetic oils and the oils A111, A113 and A300 (***see page 18***).

**Proceed as follows**:
- Disassemble the pump completely and clean it (***see page 49***).
- Reassemble it.
- Connect an oil mist eliminator to the pump exhaust.
- Fill the pump with the new oil (***see page 19***).

**NOTE**: to replace a synthetic oil by a mineral oil, proceed as for compatible oils.

**In all cases, follow the recommendations of the pump integrators for the choice of the oil to be used.**

**NOTE:** When the oil type is changed, it is mandatory to replace the oil mist eliminator cartridge, mainly on C2 models.

# Replacement of external shaft seal

**In the event of an external oil leak on the pump, it is necessary to change the external shaft seal on the motor side (*see page N – 4*).**

You will need:
- a front seal replacement kit (***see page 47***),
- a screwdriver,
- a 3, 4 and 5 mm Allen wrench.

Stop the pump and disconnect the power cord motor.

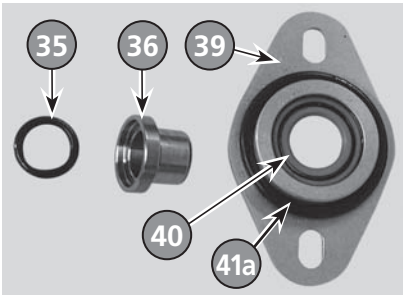
Disconnect the pump from the installation to which it is connected.

If possible, position the pump vertically, with the motor at the top, resting on the front side of the oil case; in this position, it is not necessary to drain the oil case. Otherwise, disassemble the pump in the horizontal position, resting it on its base, after it has been drained (***see page 44***).

Disconnect the motor by unscrewing the 4 fastening screws, simultaneously and alternately.

Remove the motor vertically.

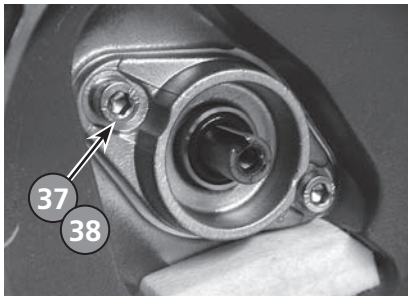
Unscrew the fan fastening screw. Remove the fan, the key and the support washer.




With a screwdriver, remove the shaft sleeve (**36**) and its O-ring (**35**).

Unscrew the two seal-holder fastening screws (**37**, **38**) and remove the seal-holder (**39**).

Remove the seal (**40**) from the seal-holder as described on ***page 55 (picture 1)*** and discard it.




Clean the metal parts. Inspect the wearing side of the shaft sleeve: after cleaning, the sleeve may show a perfectly normal trace of rubbing (caused by polishing). Should the sleeve show any signs of indentation or grooves, it must be replaced.

Use new parts from the seal kit or set of seals.

Reassemble the lip seal (**40**) in its housing as described on ***page 55***.

Reinsert the new O-ring (**41a**) on the seal-holder (**39**).

Insert the shaft sleeve inside the seal-holder (**36**).

Engage the reassembled seal-holder on its axis and screw onto the frame.

Insert the O-ring (**35**) in the shaft sleeve. Position the support washer. Then, install the key, reassemble the fan and the motor in the reverse order of disassembly.

Immediately order a replacement maintenance set or kit (***see page 47***).

# Tools and consumable products

## Special precautions

**Read the safety instructions at the beginning of the maintenance chapter.**
**Before disassembling the pump, drain it (*see page 44*).**
**All the seals and faulty parts should be replaced: provide a seal kit or a maintenance kit.**

## Spare parts

For fasted service, specify the following when ordering:
- Pump type.
- Serial number (on pump label).
- Part number (see list at end of operating instructions).

Maintenance kits containing the most frequently used parts are always available at our sales outlets. Be sure to use these kits so you will have all the parts necessary.

**Minor kit** This kit contains all the seals on the pump which must be replaced at each complete disassembly.

| Pumps | 1005 | 1015 | 2005 | 2010 | 2015 | 2021 |
|---|---|---|---|---|---|---|
| I | – | | 103912 | | | |
| SD / SDI | 103911 | 105515 | 103911 | | | |
| C1 | 104975 | | | | | |
| C2 | – | | 104975 | | | |

Keep this kit in a dry place, away from heat and light (sunlight and ultraviolet light), in order to prevent any hardening of the elastomers (see AFNOR standards: "storage conditions for vulcanized elastomer based products" - FD T.46 022).

**Major kit** In addition to the seal kit, this kit contains a set of spare parts to perform maintenance operations on the pump for a two year period, under normal operating conditions.

| Pumps | 1005 | 1015 | 2005 | 2010 | 2015 | 2021 |
|---|---|---|---|---|---|---|
| I | – | | 103906 | 103907 | 103908 | 103909 |
| SD / SDI * | 104622 | 104643 | 103902 | 103903 | 103904 | 103905 |
| C1 | 104617 | 104619 | 104976 | 104977 | 104978 | 104979 |
| C2 | – | | – | 104614 | 104615 | 104616 |

* For SDI pump with no flanged stator, use a major kit P/N 108308.

The pumps are equipped with :
- a **shouldered not chromed ring** (**36**) for I and SD models with serial number < AM656245
- a **shouldered chromed ring** (**36**) for I and SD models with serial number ≥ AM656245
- a **shouldered chromed ring** (**36**) for C1 and C2 models.

The **shouldered not chromed ring** is a spare part that must be replaced with a chromed ring.

The **shouldered chromed ring** needn't systematically to be changed.

# Tools and consumable products (cont'd)

## Spare parts (cont'd)

**Vane kits for 2-stage pumps**

This kit contains only vanes and springs in order to maintain several pumps of the same model (see table here after).

| Pumps | 2005 | 2010 | 2015 | 2021 |
|---|---|---|---|---|
| **LP stage vane kit** | **108417** | **108396** | **108397** | **108398** |
| Vane / Spring (quantity) | 20 / 22 | 20 / 42 | 20 / 62 | 20 / 62 |
| **HP stage vane kit*** | **108417** | **108399** | **108399** | **108399** |
| Vane / Spring (quantity) | 20 / 22 | 20 / 22 | 20 / 22 | 20 / 22 |

* except model C2.

| Pumps | 2005 | 2010 | 2015 | 2021 |
|---|---|---|---|---|
| **Oil vane pump kit**** | **108407** (10 vanes) | | | |

** except model SD.

**External shaft seal replacement kit** (parts for shaft passage tightness on motor side)

This kit contains all the parts which must be replaced in the event of a leak on the shaft on the motor side.

| Pump models | P/N |
|---|---|
| **All pumps** | **065612** |

## Screw kit

This kit contains all screws and washers for the range of Pascal's pump.

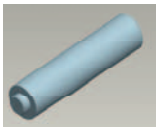
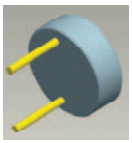
| Pump models | P/N |
|---|---|
| **All pumps** | **104919** |

## Specific tools

**Tools kit**

This kit contains the usefull tools to disassemble and reassemble the shaft seals in the different flanges and flanged stators (see table bellow).

| Pump models | P/N |
|---|---|
| **All pumps** | **112397** |

| | HP and LP no flanged stator (*plan D*) | HP flanged stator (*plan C*) | LP flanged stator (*plan C*) |
|---|---|---|---|
| **Lip seal assembly mandrel**  | **A462651** | **A462651** | **A462651** |
| **Protective sleeve** | **A463545** | **A463545** | **A463545** |
| **Lip seal disassembly mandrel**  | – | – | **A462649** |

## Recommended tools

- Two 5.5 x 100 flat screwdrivers
- Thin spanner: 10 mm on face
- Allen wrenches: 2.5 - 3 - 4 - 5 - 12 mm
- 12 mm box wrench

# Disassembling the pump

## Removing pump from system

**Study the general precautions listed on Maintenance chapter page 39.**

The following steps are necessary to protect the pump as far as possible from the effects of corrosion:

- Flush pump with a neutral gas (dry nitrogen) during half an hour to prevent toxic or corrosive gases accumulating in the pump.
- C2 Model: Disconnect the nitrogen lines to the pump.
- Disconnect the pump from the system and seal off the inlet and exhaust ports. Bring the pump to the maintenance area immediately.
- Drain pump (***see page 44***).

**⚠ DANGER**

**Do not store a pump in this condition for any length of time: once the neutral gas has dissipated, the inside of the oil case will be in contact with the ambient air laden with water vapor; this may react with the pumped gases to form acids that may corrode the pump even at room temperature.**

The first phase of disassembly is to disassemble the motor, the second is to disassemble the pumping module.

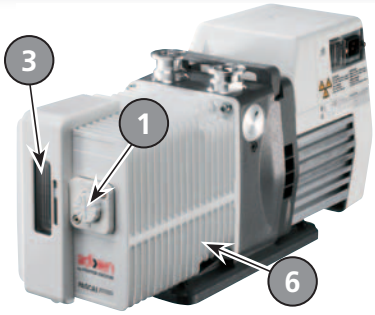
**Follow the chronological order of disassembling instructions.**
**See the drawings and their part lists in pages *N – 1* to *N – 23*.**

## Disassembling the motor block

3 Remove the motor cover.

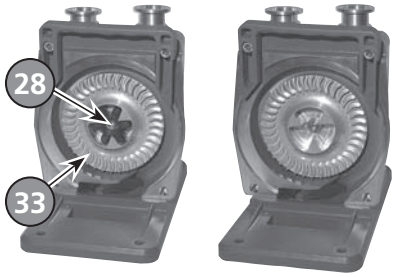
5 Remove the motor attachment screws (**5**) (***see page N – 18***).

If the motor is damaged, replace it (***see page N – 19***).




## Disassembling the fan coupling
**(*see page N – 2*)**

4 Remove the fan (**33**) fastening screw (**28**) and the support washer (**26**). Remove the key.



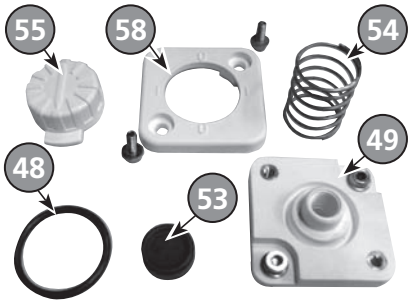

## Replacing the front seal

See ***page 46***.

## Disassembling the gas ballast
**except model pump C2**
**(*see page N – 2*)**

2.5 Remove the gas ballast cover (**58**) (2 screws), the adjustment button (**55**), the spring (**54**) and the sleeve (**53**).

Remove the tank feed-through (**49**) (2 screws) and its seal (**48**).

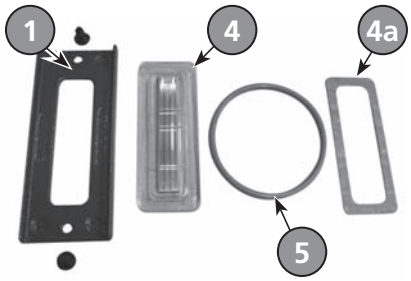


# Disassembling the pump (cont'd)

## Disassembling the oil sight glass
**(*see page N – 2*)**

3 Remove the sight glass cover (**3**).

Remove the plate (**1**), the ring (**4a**), the sight glass (**4**) and the O-ring (**5**).



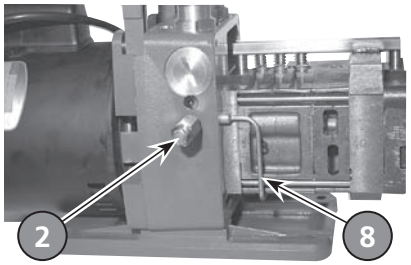

## Removing the oil case
**(*see page N – 2*)**

5 Remove the oil case (**6**) and its O-ring (**11**) after removing the 4 fastening screws (**9**).

## Disassembling the bubbler (C2 pump)
**(*see page N – 20*)**

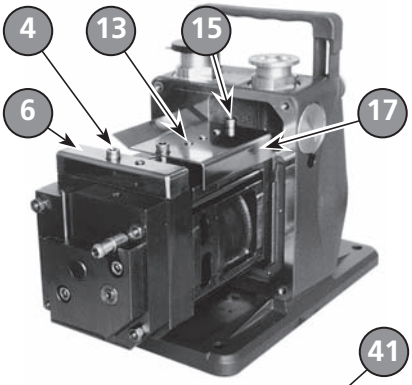
10 Disconnect the nitrogen inlet. Remove the nitrogen inlet and disconnect the coupling (**2**) and the connector (**6**).

Disconnect the nut (**16**) which secures the tube on the functional block and pull the bubble (**8**) to release it from the frame.



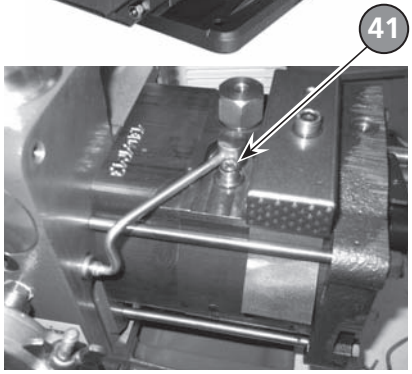

## Disassembling the exhaust valve cover
**(*see page N – 6*)**

5 Remove the screws (**4**) (**13**) (**15**) and the cover(s) (**6**) (**17**), the exhaust valves (**2**) (**11**) and their springs (**3**) (**12**).

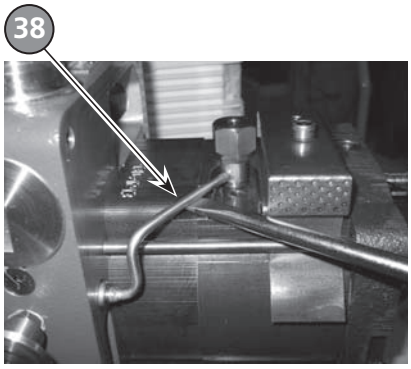



## Disassembling the sniffer pipe
**(SDI model)**
**(*see page N – 10*)**

5 Remove the screw (**41**) and its washer.



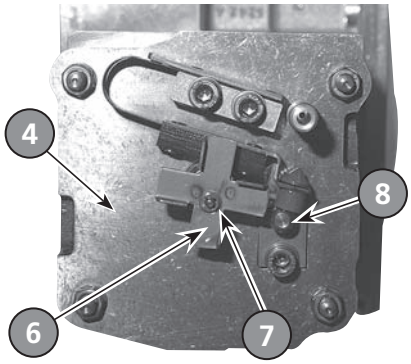

Insert a flat screwdriver near to the stator connector, and use it as lever arm to remove the sniffer pipe (**38**) from the stator. Then, pull on the other end of the pipe to remove it from the housing.



## Disassembling the SD / SDI pump oil system

**(except 1015 SD)**
**(*see page N – 16*)**

**The oil system is set in the factory, it must be reset in the event of disassembly** (see reassembly). However, the rear flange (**4**) can be disassembled without modifying the setting.
Remove the spinner-cam (**6**) by removing the circlip (**7**).
Do not disassemble the nozzle (**8**) to clean it. During the reassembly, check that it is not blocked by sending a jet of compressed air through it.




## Disassembling the pump oil system

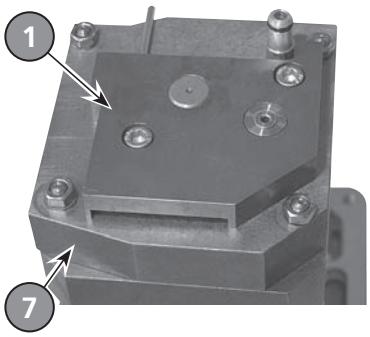
**I, C1, C2 pumps and 1015 SD**
**(*see page N – 14*)**

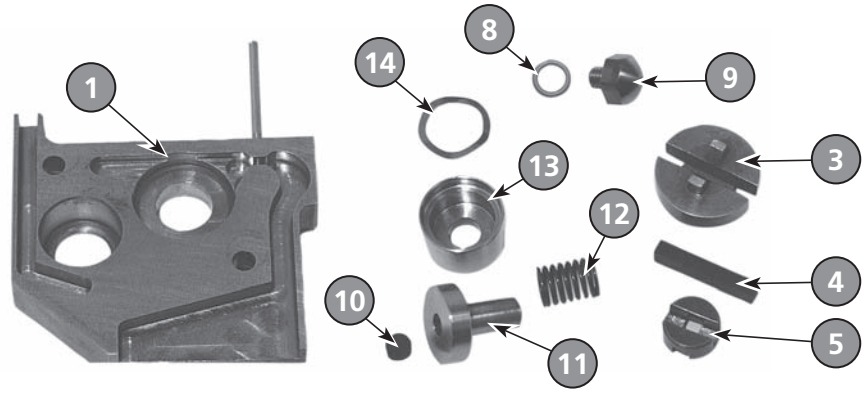
5 Remove the cover from the oil pump (**1**). Release the cylinder (**13**) equipped with the washer (**14**), piston (**11**) and spring (**12**).

Release the stop valve (**10**) from its housing.

12 In the rear flange, unscrew the seat of the stop valve (**9**) and remove the O-ring (**8**).

Then remove the vane (**4**), the oil pump rotor (**3**) and the Oldham coupling (**5**).




## Disassembling the rear flange

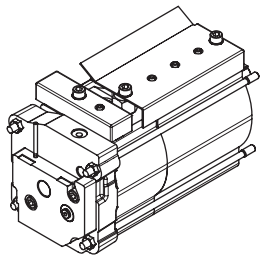
**(*see pages N – 14 et N – 16*)**

10 Remove the 4 nuts. Release the flange (**7**) in the axis.

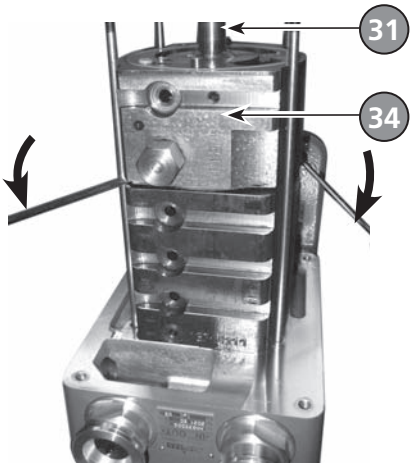
# Disassembling the pump (cont'd)

## Disassembling the pumping module with flanged stator

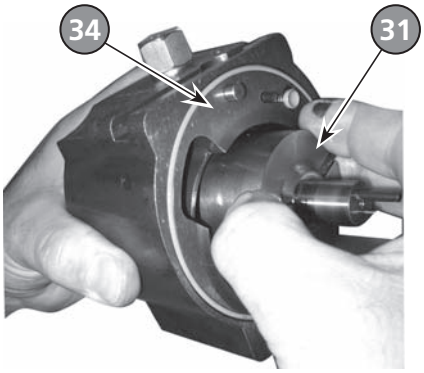
*(see N – 10)*



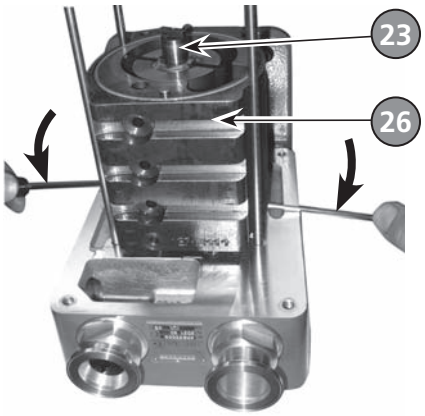
**1** Insert two screwdrivers in the notches and release the set HP stator (**34**) and HP rotor (**31**) in the axis.



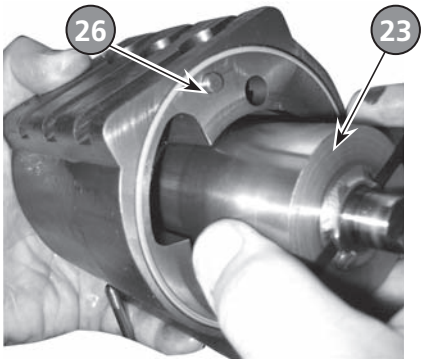

**2** Release the HP rotor (**31**) from the HP stator (**34**) and the vanes.




**3** Insert two screwdrivers in the notches and release the set BP stator (**26**) and BP rotor (**23**) in the axis.

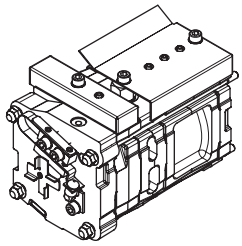



**4** Release the BP rotor (**23**) from the BP stator (**26**) and the vanes.

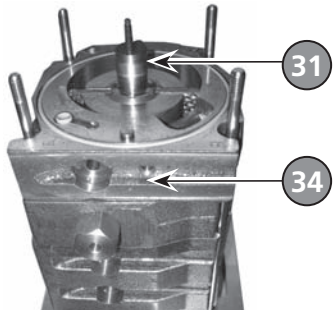


## Disassembling the pumping module with no flanged stator

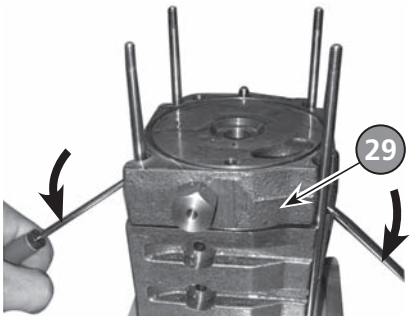
*(see* N – *6)*



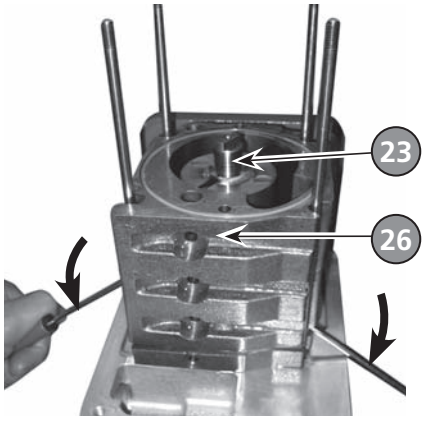
**1** Remove the HP stator (**34**) by sliding it along the HP rotor (**31**).
Remove the HP rotor and the vanes.



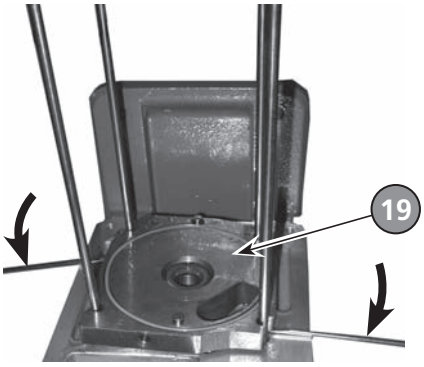

**2** Insert two screwdrivers in the notches and release the central plate (**29**) in the axis.




**3** Insert two screwdrivers in the notches and release the BP stator (**26**) by sliding it along the BP rotor (**23**).
Remove the BP rotor and the vanes.




**4** Release the front plate (**19**).




**Note :** If one of the pumping module part with no flanged stator is damaged and must be replaced, it is necessary to replace it by new parts from a flanged stator configuration (***refer to N - 21, N - 23 for spare part list***).

# Cleaning components

## Cleaning metal components

Solvents are required to clean components.

Standard precautions should be taken in compliance with the manufacturer's instructions.

**After use in mineral or synthetic oil**, clean the metal components with a mineral products based solvent such as **AXAREL**(1) , **CARECLEAN**(2), **PREMACLEAN**(3), **NAPHTESOL**(4). Proceed as follows:
- Clean when cold or hot (max. 45°C) by dipping or using a cloth
- Vacuum dry in a ventilated oven
- **The component must be cleaned a second time with alcohol.**

**After use in (perfluorinate) synthetic oil**, clean the metal components in a solvent such as **GALDEN S 90**™(5) and proceed as follows:
- Clean when cold by dipping or using a cloth
- Dry the components in the air or with compressed air

**After use in (non-perfluorinate) synthetic or mineral oil,** clean the metal components with a solvent such as alcohol and proceed as follows:
- Clean when cold by dipping or using a cloth
- Dry the components in the air
- Industrial washing solutions can also be used. The cleaning operation should be followed by vacuum drying.

## Cleaning the oil level sight glass

**I, SD, SDI, C2 series pumps**

When cleaning this plastic sight glass, avoid contact with alcohol or alcohol-based washing solutions. Clean the component with a solvent, but do not steep it, and rinse it immediately.

**C1 series pumps**

The sight glass of these pumps is made of glass: it can be cleaned with common used solvents.

**(1) DUPONT DE NEMOURS registered trademark**
**(2) CASTROL registered trademark**
**(3) DOW registered trademark**
**(4) Nippon Oil Corporation registered trademark**
**(5) MONTEDISON registered trademark**

# Replacement of shaft seals

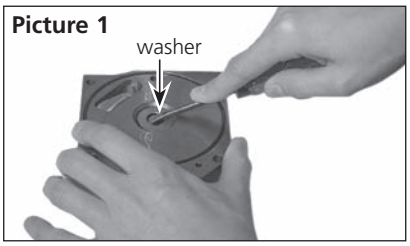
**Specific tools**

- Specific extraction tool.
- Specific assembly mandrel.
- A support plate (or washer).

**Recommended tools**

- A flat screwdriver .
- A hammer.

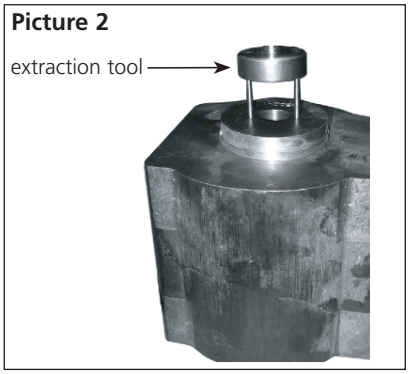
**Picture 1**




## Extracting a shaft seal from its housing

- Flange (**picture 1**): the seal is extracted using a screwdriver, resting on the plate (or washer) so as not to damage the seal housing, or
- Flanged stator (**picture 2**): the seal is extracted with the specific extraction tool.

**Picture 2**



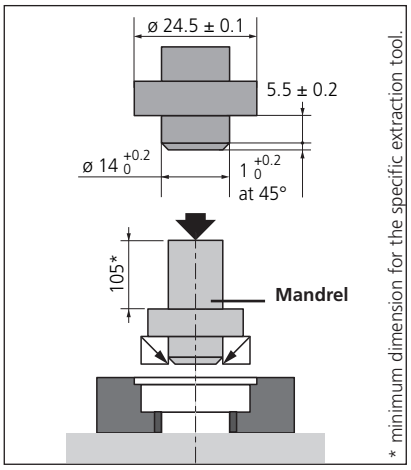

## Assembling the shaft seal

The seal housing and the seal lip are lubricated with the lubricant used in the pump.
The flange is resting on a flat surface.

**According to the direction of assembly**, the seal is fitted on the assembly mandrel.

Using a press or a hammer, the seal is inserted in its housing.

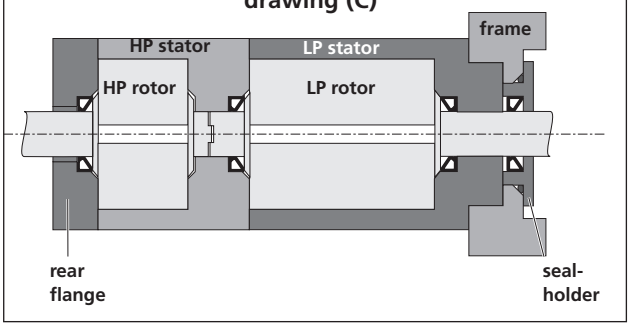
Check the position of the seal: it must lean against its bearing.



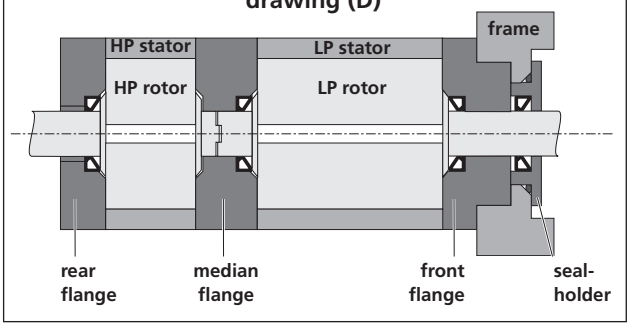

## Direction of assembly of shaft seals

They are fitted using the assembly mandrel according to the direction of assembly below:

**Assembly of pumping module with flanged stator drawing (C)**




**Assembly of pumping module with no flanged stator drawing (D)**



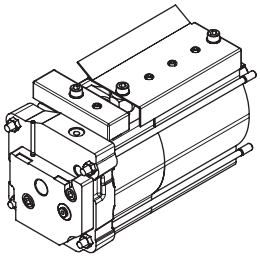
# Reassembling the pump

## Component preparation

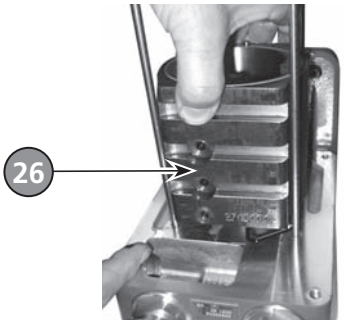
- All surfaces in contact are coated with oil.
- Check that the lubrication holes are not blocked.
- Observe the **nominal clamping torques for the reassembly of the functional block (see chapter "Nomenclature")**.
- Rest the frame (**42**) on a flat surface in order to raise the pump.

## Reassembling the pumping module with flanged stator

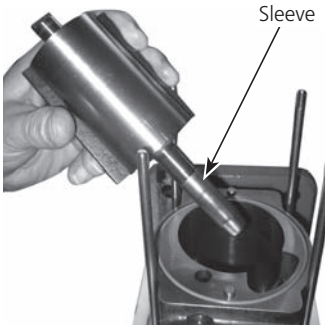
*(see page N – 10)*



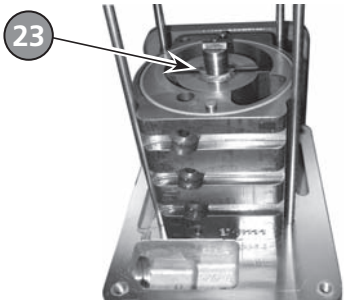
**1** Place the BP stator (**26**) on the frame (**42**).
If there is no centering pin, align the top of the stator with the exhaust notch in the housing.



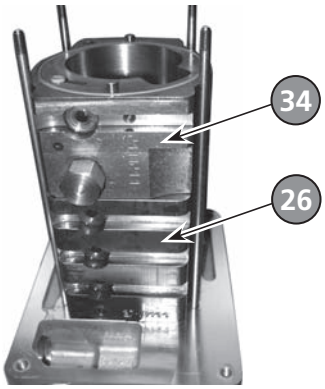

**2** For not damage the shaft seal, use protective sleeve on the rotor axis (or wrap end of shaft with adhesive tape) and oil it.




**3** Slide the BP rotor (**23**) equipped with its vanes and springs (rounded edges facing outwards) in the BP stator (**26**). Remove the protective sleeve

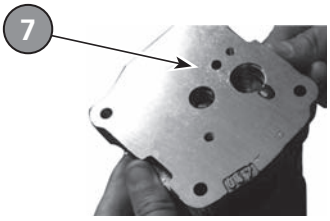



**4** Place the HP stator (**34**) on the BP stator (**26**).



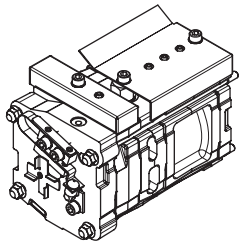

**5** Slide the HP rotor (**31**) equipped with its vanes and springs (rounded edges facing outwards) in the HP stator (**34**).

**6** Place the rear flange (**7**) on the HP stator (**34**).

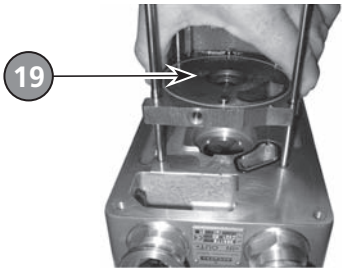


## Reassembling the pumping module with no flanged stator

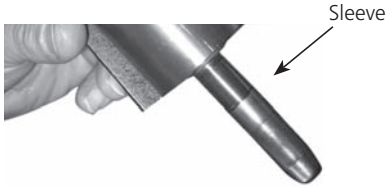
*(see page N – 6)*



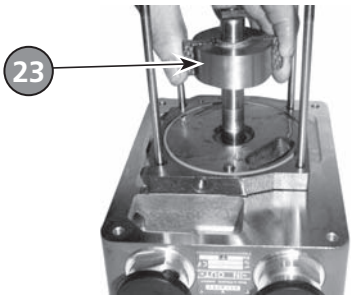
**1** Fit the front plate (**19**) on the frame (**42**).



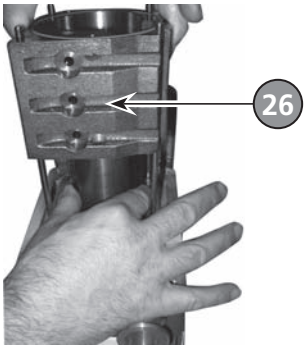

**2** For not damage the shaft seal, use protective sleeve on the rotor axis (or wrap end of shaft with adhesive tape) and oil it.



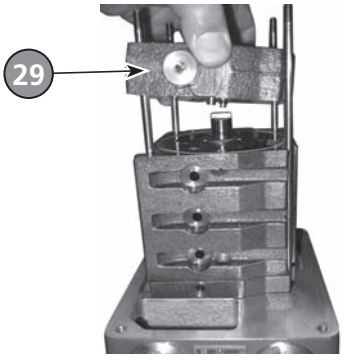

**3** Place the BP Rotor (**23**) equipped with its vanes and springs (rounded edges facing outwards) on the front plate (**19**). Remove the protective sleeve.



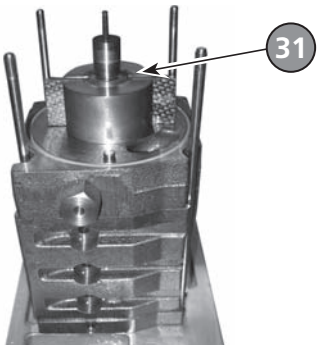

**4** Slide the BP stator (**26**) on the BP rotor (**23**).



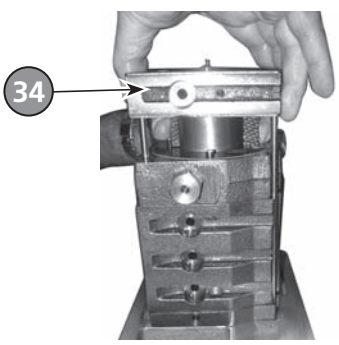

**5** Place the central plate (**29**) on the BP stator (**26**).



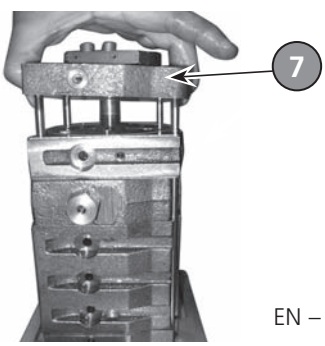

**6** Place the HP rotor (**31**) equipped with its vanes and springs (rounded edges facing outwards) on the central plate (**29**).




**7** Slide the HP stator (**34**) on the HP rotor (**31**).




**8** Place the rear plate (**7**) on the HP stator (**31**).



# Reassembling the pump (cont'd)

## Reassembling the oil system

Check that the nozzle is not blocked by sending a jet of compressed air through it.

**Spinner-cam, SD and SDI pumps** (except 1015 SD) **(*see page N – 16*)**

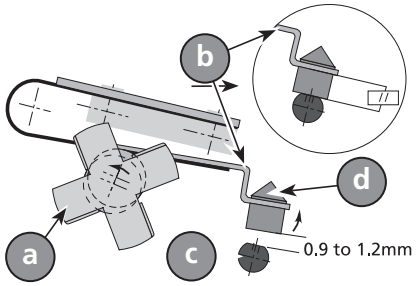
Place the spinner-cam system on the rear plate (**4**) and fix it with the clips (**7**).

**Spinner-cam settings**

Offset the spinner-cam (**a**) by pressing on the blades.

Turn the shaft up to the maximum displacement of the lever (**b**).

The distance between the seat (**c**) and the stop valve (**d**) must be 0.9 to 1.2mm (0.035 to 0.047 inch): it is set by adjusting the orientation of the lever.




The stop valve face must be perpendicular to the axis of the oil inlet hole; when free,the stop valve should rest on its seat: check the parallelism of the lever in relation to the bearing face of the stop valve seat. Orient the seat to obtain the correct setting.

**Oil pump, I, C1 and C2 pumps** (and 1015 SD) **(*see page N – 14*)**

In the rear plate (**7**), place the Oldham coupling (**5**), the vane (**4**) and the rotor (**3**).

Screw the seat (**9**) equipped with its O-ring (**8**). Place the piston (**11**) with its antisck-back device (**10**), the spring (**12**), the cylinder (**13**) and the washer (**14**).

**Oil pump settings**

Position the rotor of the oil pump so that the slot is horizontal (or parallel with the pump base). To turn it, use the fan.

## Reassembling the exhaust valve cover

**(*see page N – 6*)**

Pump in a horizontal position, pour a small quantity of oil beforehand around the exhaust valve holes.
Place the valves (**2**) or (**11**) equipped with the springs (**3**) or (**12**)
Place the valve covers (**6**) or (**17**) and fix them with screws and washers.

## Reassembling the bubble device

**C2 pump (*see page N – 20*)**

Insert the bubbler (**8**) equipped with its o-ring in the frame.
Position the tube fastener (**9**) on the pin and tighten the nut on the rear plate (**7**).
Insert the ball (**4**), the spring (**5**) in the coupling (**2**) and tighten it on the connector (**6**).

## Reassembling the oil casing

**(*see page N – 6*)**

Fit the oil casing (**6**) equipped with its o-ring (**11**) on the frame (**42**).
Tighten it with screw (**9**) and washers (**10**) ( after making sure that the seal is positioned in its seal groove).

## Reassembling the oil level sight glass

**(*see page N – 2*)**

Place the o-ring (**5**) in its groove and fit the sight glass (**4**), the flat ring (**4a**), the oil sight glass cover (**3**) and tighten with screws (**2**).

**⚠ CAUTION**

**C1 series pump: The sight glass is made of glass: gradually tighten the two attachment screws in alternation to avoid placing the sight glass under stress.**

## Reasembling the gas ballast

**(*see page N – 2*)**

Position the oil case feed-through (**49**) equipped with its o-ring (**48**) in its housing by centering it on the gas ballast tube (**46**). Assemble using the screws (**52**).

Equip the adjustment knob (**55**) with the sleeve (**53**) and the spring (**54**). Position the assembly in the cover (**58**) and secure on the oil case feed-through (**49**) with screws (**57**).

## Reassembling the seal-holder
**(*see page N – 2*)**

(***See page 46***).

## Reassembling the fan and the motor side components
**(*see page N – 2*)**

Fit the coupling fan (**33**) and secure it with the screw (**28**) and washer (**26**).
Fit the drive key on the motor shaft. Install the motor coupling (**3**) down to the stop on the motor shaft and secure it with the screw (**2**).
Install the plastic coupling (**4**) on the motor coupling (**3**).
Fit the motor on the frame and secure with the 4 mounting bolts (**5**).

## Fill with oil

After reassembling, fill the pump with oil (***see page 19***) before start-up the pump (***see page 29***).

## Reassembling of the pumping pipe (model SDI)

Position one the end of the pipe (***38***) into the housing hole designed for this purpose and the other end on the stator (**34**).
Do not forget to install o-rings (**39**) and (**40**) after having checked their status (no cuts).

# Declaration of contamination

## Procedure for returning products

You wish to return an adixen product for maintenance. The equipment will be dismantled and possibly cleaned by a technician from our service centre. Pfeiffer Vacuum requires this form to be completed to preclude the potential health risk to its service personnel that can occur when receiving, disassembling, or repairing potentially contaminated products..

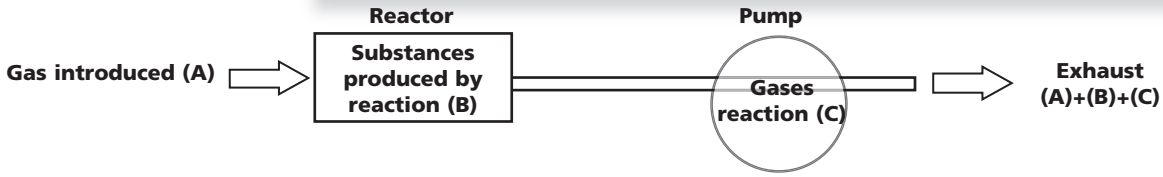
**Please fill in the present DECLARATION OF CONTAMINATION, print it and attach it to the product before shipping to your closest service center.**
**Equipment returned without this form fully completed, and secured to outside of package, will be returned to customer unprocessed, at his cost.**
**If following inspection and quotation, customer elects to not proceed with repair, he will be subject to service fee to cover product decontamination, disassembly, cleaning and evaluation costs.**
Please contact service center for any further recommendations.

**We wish to draw your attention to the following points:**
Equipment must be drained of fluids and residue, securely packaged and shipped prepaid.
Concerning the closing of the ports (inlet & outlets of the product), metallic airtight blank flanges should be used if toxic or copper gases have been pumped.
**The risk may be of the following nature:**

- **Chemical:** Danger to health, risks of explosion, fire, risks for the environment. Please indicate the chemical formula and name of the gases or substances that have been in contact with the equipment (pump, detector, gauge or accessory).
- **Biological:** In case of contamination (such as pathogenic germs, micro-organisms (bacteria, viruses, etc.) classes 1 to 4 and group E), we are currently unable to decontaminate and recycle such material without risk to the safety of our staff. **Please contact us before sending the product** to the service center.
- **Radioactive:** In case of contamination, our Service Center is currently unable to decontaminate and recycle such material without risk to the safety of our staff. A written evidence of decontamination will be requested prior to any service action. **Please contact us before sending the product** to the service center.
- **Copper contamination:** Copper based by-products formed in sputtering or etching processes are considered as a poison in some semi-conductor processes. A specific treatment is required, which generates extra cost.

**⚠ AVERTISSEMENT**

**In the event of chemical contamination, please indicate the following gases or substances:**




- Gases (or substances) introduced into the reactor and which may be found at the exhaust **(A)**.
- Gases (or substances) resulting from the reaction or process **(B)**.
- Gases (or substances) that may possibly be formed inside the pump (due to a thermodynamic or chemical reaction, condensation, deposition, precipitation, etc.) **(C)**.

## DECLARATION OF CONTAMINATION

Repair and/or maintenance will be carried out on vacuum equipment or components only if a fully completed, correct declaration of contamination is provided. If it is not the case, the corresponding repair will be delayed or omitted. A separate declaration must be submitted for each device or each component.

**This declaration can only be completed and signed by an authorised and qualified person.**

### 1. EQUIPEMENT

Description:

Reference (P/N):

Serial N°:

### 2. REASON FOR RETURN - SERVICE REQUIRED (mandatory)

Return N°:

☐ Under warranty ☐ Out of warranty

### 3. EQUIPMENT CONDITION

Has the equipment been used ? yes ☐ no ☐

Type of pump oil used :

Has the equipment been cleaned? yes ☐ no ☐

Cleaning detergent /method:

Is the equipment free from potential harmfull substances ?

yes ☐ no ☐

### 4. COPPER PROCESS

Has the equipment been used **on a Copper process ?**

yes ☐ no ☐

If «yes», sealed package and specific label are required

### 5.1 PROCESS RELATED CONTAMINATION Chimique

| | | |
|---|---|---|
| Toxic | yes ☐ | no ☐ |
| Carcinogenic | yes ☐ | no ☐ |
| Combustible | yes ☐ | no ☐ |
| Corrosive | yes ☐ | no ☐ |
| Explosive | yes ☐ | no ☐ |
| Biological* | yes ☐ | no ☐ |
| Radioactive* | yes ☐ | no ☐ |

Others

(*) The equipment will be accepted only with a written decontamination certificate

### 5.2 Process and list of hazardous substances or by-products which may have come into contact with the equipment :

| | Chemical name (or symbol) | Risks and precautions associated with substances | Process description |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |

### 6. Legally binding declaration

We hereby guarantee that the information in this declaration is correct and complete. I, undersigned, am able to provide a true assessment. We are aware of our liability toward the contractor for damage resulting from incomplete or inaccurate details; we undertake to be responsible for any third-party claims based upon claims of contamination or other nonconformity with the statements herein.

Name of the company / organization:

Address:

City: State: Post Code:

Country: Albanie E-mail address:

Phone number: Signature and company seal:

Last Name:

First name:

Function: Date: 25/06/12

Specimen

adixen
by PFEIFFER VACUUM

# DECLARATION OF CE CONFORMITY

We, **adixen Vacuum Products**
98, avenue de Brogny · BP2069
74009 Annecy cedex – France

**ISO 9001 CERTIFIED**

declare under our sole responsibility that the following products:

Pascal Series / Rotary Vane Pumps

1005SD - 1015SD
2005I - 2005SD - 2005SDI - 2005CI
2010I - 2010SD - 2010C1 - 2010C2
2015I - 2015SD - 2015C1 - 2015C2
2021I - 2021SD - 2021C1 - 2021C2
2033SD - 2033C1 - 2033C2
2063SD - 2063C1 - 2063C2

to which this declaration relates are in conformity with the relevant provisions of the following European Directives:

**2006/042/EC: Machinery directive**
**2006/095/EC: Low voltage directive**
**2004/108/EC: Electromagnetic Compatibility Directive**
**2002/095/EC: Restriction of Hazardous Substances**

when used in accordance with the instruction manual of the product.
The relevant operating instructions are in compliance with appendix VII, part B.

Those products comply with the relevant provisions of the above Directives and carry the CE marking.

Signatures:

Annecy, July 13, 2012
Authorized person to compile the relevant technical documentation:

Mr. Eric TABERLET
President

Mr. Gilles BARET
Products and Technology Director
98, avenue de Brogny · BP 2069 / 74009 Annecy - France

LANGUAGE : ENGLISH

# Composants de maintenance / Maintenance components / Ersatzteilliste


| | | |
|---|---|---|
| Plan de montage cuve et bâti | Oil casing and central housing assembly drawing | Gesamtplan Ölbehälter und Pumpenträger 2 / 4 |
| Nomenclature cuve et bâti | Oil casing and central housing part list | Nomenklatur Ölbehälter und Pumpenträger 3 / 5 |
| Plan du bloc fonctionnel (avec stator non flasqué) (D) | Pumping module drawing (with no flanged stator) (D) | Gesamtplan: Funktionsblock mit Stator und Flanschen (D) 6 / 8 |
| Nomenclature du bloc fonctionnel (avec stator non flasqué) (D) | Pumping module part list (with no flanged stator) (D) | Nomenklatur: Funktionsblock mit Stator und Flanschen (D) 7 / 9 |
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| Nomenclature du bloc fonctionnel (avec stator flasqué) (C) | Pumping module part list (with flanged stator) (C) | Nomenklatur: Funktionsblock mit Stator-Monoblock (C) 11 / 13 |
| Plan du système de lubrification pompe à huile (A) | Oil pump system drawing (A) | Gesamtplan (A) Ölpumpsystem 14 |
| Nomenclature du système de lubrification pompe à huile (A) | Oil pump system part list (A) | Nomenklatur (A) Ölpumpsystem 15 |
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| Nomenclature du système de lubrification levier moulinet (B) | Oil system part list (B) | Nomenklatur (B) Flügenrad-Ölsystem 17 |
| Plan ensemble motorisation (M) | Motor assembly drawing (M) | Gesamtplan (M) Motor 18 |
| Nomenclature ensemble motorisation (M) | Motor assembly part list (M) | Nomenklatur (M) Motor 19 |
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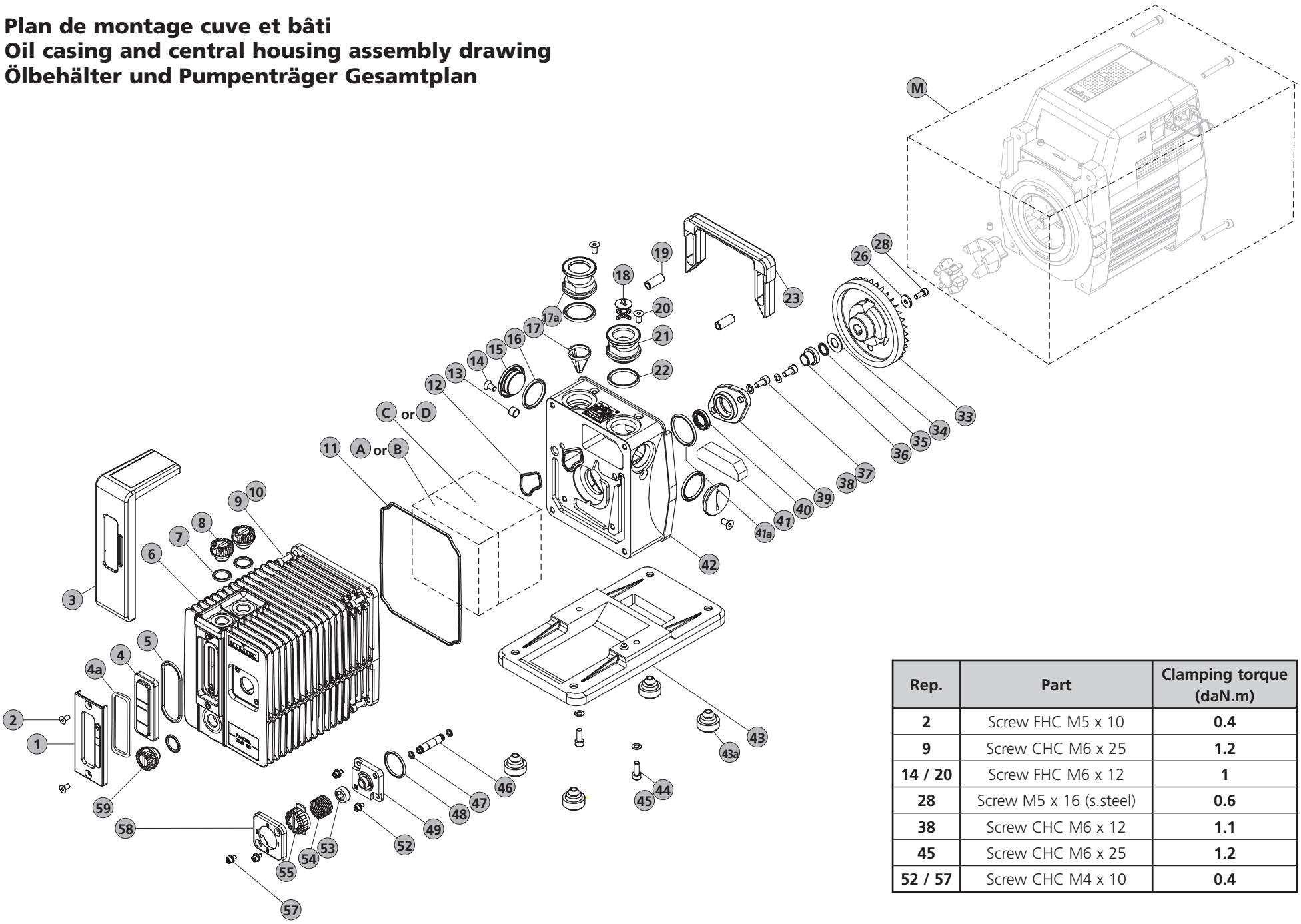
| Remplacement des pièces du bloc fonctionnel non flasqué | Pumping module (with no flanged stator) spare parts | Pumpenblock (mit Stator und Flanschen) Unterhaltung Teile 21 |

# Plan de montage cuve et bâti
# Oil casing and central housing assembly drawing
# Ölbehälter und Pumpenträger Gesamtplan



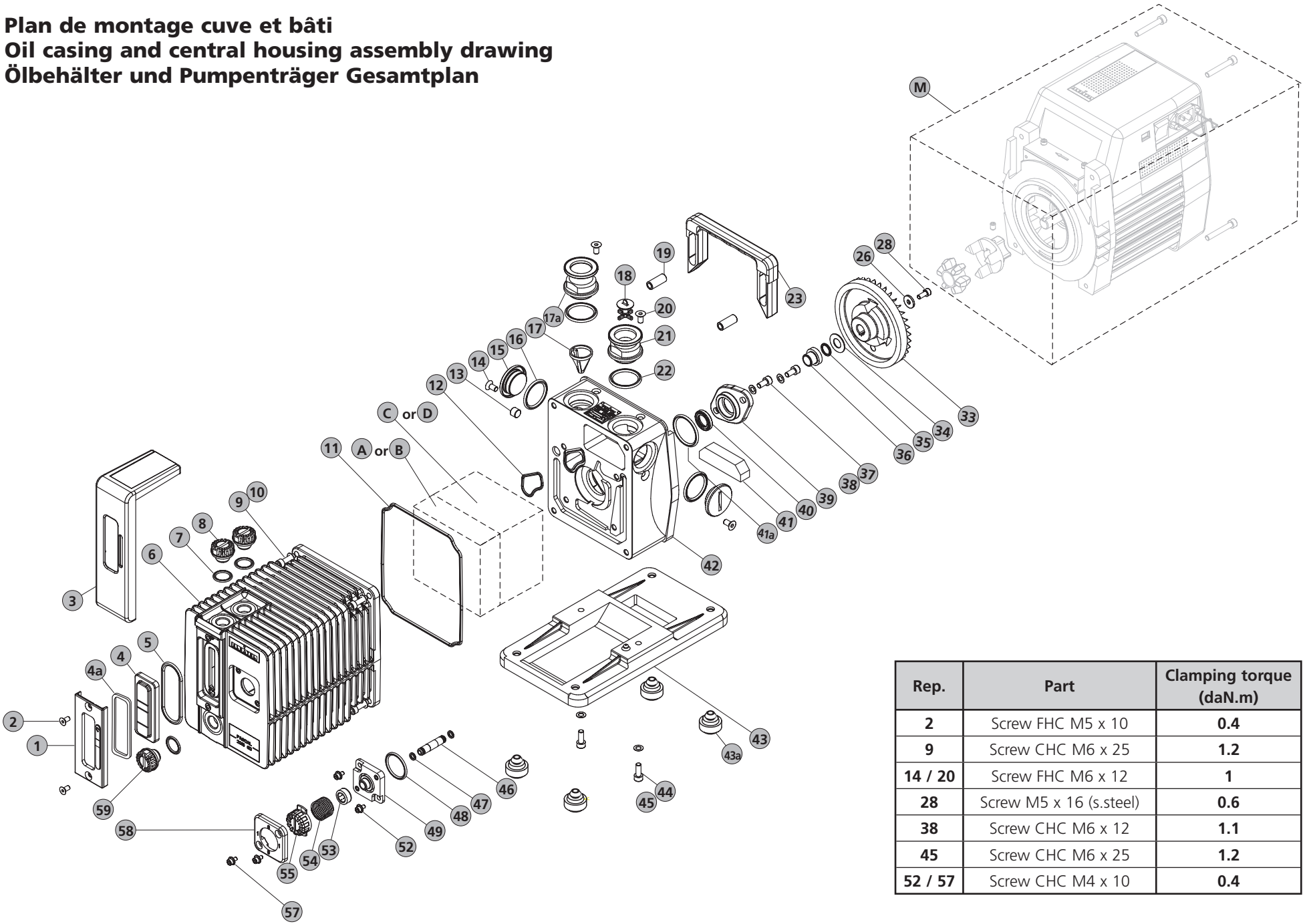

| Rep. | Part | Clamping torque (daN.m) |
|---|---|---|
| **2** | Screw FHC M5 x 10 | **0.4** |
| **9** | Screw CHC M6 x 25 | **1.2** |
| **14 / 20** | Screw FHC M6 x 12 | **1** |
| **28** | Screw M5 x 16 (s.steel) | **0.6** |
| **38** | Screw CHC M6 x 12 | **1.1** |
| **45** | Screw CHC M6 x 25 | **1.2** |
| **52 / 57** | Screw CHC M4 x 10 | **0.4** |

# Nomenclature cuve et bâti / Oil casing and central housing part list / Ölbehälter und Pumpenträger Nomenklatur

| REP | DÉSIGNATION | SPECIFICATION | BENENNUNG | Types/model | | | | | | | | | | | | | | | | | | REF. P/N Bestell. Nr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2005 I | 2010 I | 2015 I | 2021 I | 2005 SD | 2005 SDI | 2010 SD | 2015 SD | 2021 SD | 1005 SD | 1015 SD | 2010 C2 | 2015 C2 | 2021 C2 | 2005 C1 | 2010 C1 | 2015 C1 | 2021 C1 | |
| 1 | Plaque de niveau | Level plate | Ölmesstab | 1 | 1 | 1 | 1 | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **106610S** |
| 1 | Plaque de niveau | Level plate | Ölmesstab | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | **106609S** |
| 2 | Vis FHC M5 x 10 | Screw FHC M5 x 10 | Schraube FHC M5 x 10 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ✜ |
| 3 | Cache de niveau (gris) | Oil sight glass cover (grey) | Ölschauglassdeckel (grau) | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **102849** |
| 3 | Cache de niveau (blanc) | Oil sight glass cover (white) | Ölschauglassdeckel (weiss) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | **102848** |
| 4 | Voyant | Oil level sight glass | Ölschauglas | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ■ |
| 4a | Joint de niveau | Flat ring | Flachdichtung | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 5 | Joint torique c 3,53 - d 63,1 | O-ring c 3.53-d 63.1 | Dichtung c 1,9 - d 7,2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 6 | Cuve équipée | Oil casing | Ölbehälter | 1 | | | | 1 | 1 | | | | 1 | | | | | | | | | **119509** |
| 6 | Cuve équipée | Oil casing | Ölbehälter | | 1 | | | | | 1 | | | | 1 | | | | | | | | **119508** |
| 6 | Cuve équipée | Oil casing | Ölbehälter | | | 1 | | | | | 1 | | | | | | | | | | | **119507** |
| 6 | Cuve équipée | Oil casing | Ölbehälter | | | | 1 | | | | | 1 | | | | | | | | | | **119506** |
| 6 | Cuve équipée | Oil casing | Ölbehälter | | | | | | | | | | | | 1 | | | | 1 | | | **119512** |
| 6 | Cuve équipée | Oil casing | Ölbehälter | | | | | | | | | | | | | 1 | | | | 1 | | **119511** |
| 6 | Cuve équipée | Oil casing | Ölbehälter | | | | | | | | | | | | | | 1 | | | | 1 | **119510** |
| 6 | Cuve équipée | Oil casing | Ölbehälter | | | | | | | | | | | | | | | 1 | | | | **119513** |
| 7 | Joint torique c 2,7 - d 16,9 - Bague R13 | O-ring c 2.7 - d 16.9 - Ring R13 | Dichtung c 2,7 - d 16,9 - Ring R13 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | ● |
| 8 | Bouchon G 3/8 | Plug G 3/8 | Blindstopfen G 3/8 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | | | | | | | | ■ |
| 8 | Bouchon G 3/8 | Plug G 3/8 | Blindstopfen G 3/8 | | | | | | | | | | | | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | **052752** |
| 9 | Vis CHC M6 x 25 | Screw CHC M6 x 25 | Schraube CHC M6 x 25 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | 4/6 | ✜ |
| 10 | Rondelle | Washer | Unterlegscheibe | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | 4/8 | ✜ |
| 11 | Joint torique c 3-d 165 | O-ring c 3 - d 165 | Dichtung c 3 - d 165 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 12 | Joint torique c 2,5-d 33,5 | O-ring c 2.5 - d 33.5 | Dichtung c 2,5 - d 33,5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 13 | Bouchon G 1/8 | Plug G 1/8 | Blindstopfen G 1/8 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | | | | 1/3 | 1/3 | 1/3 | 1/3 | ■ |
| 14 | Vis FHC M6 x 12 | Screw FHC M6 x 12 | Schraube FHC M6 x 12 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | ✜ |
| 15 | Obturateur M 30x1 | Stopper M 30 x 1 | Deckel M 30 x 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | | | | | | **065821** |
| 15 | Obturateur M 30x1 | Stopper M 30 x 1 | Deckel M 30 x 1 | | | | | | | | | | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | **065816** |
| 16 | Joint torique c 3,6-d 29,3 | O-ring c 3.6-d 29.3 | Dichtung c 3,6 - d 29,3 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | ● |
| 17 | Filtre d'aspiration | Inlet filter | Ansaugfilter | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | **065787** |
| 17 | Filtre d'aspiration | Inlet filter | Ansaugfilter | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103395** |
| 17a | Embout d'aspiration | Inlet nipple | Ansaugstutzen | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | **065819** |
| 17a | Embout d'aspiration | Inlet nipple | Ansaugstutzen | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **065814** |
| 18 | Soupape de refoulement | Exhaust valve | Auspuffventil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | ● |
| 19 | Entretoise poignée | Handle brace | Griffsteg | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | **102930** |
| 20 | Idem 14 | Idem 14 | Ebenso 14 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | ✜ |
| 21 | Embout refoulement DN 25 | Exhaust nipple DN 25 | Auspuffstutzen DN 25 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | **065820** |
| 21 | Embout refoulement DN 25 | Exhaust nippleDN 25 | Auspuffstutzen DN 25 | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **065815** |
| 22 | Idem 16 | Idem 16 | Ebenso 16 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | ● |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✜ Lot visserie / Screw kit / Schraubensatz ❍ Lot palettes / Vane kit / Schieberssatz ✱ Kit joint avant / Front seal kit / Dichtungssatz

# Plan de montage cuve et bâti
# Oil casing and central housing assembly drawing
# Ölbehälter und Pumpenträger Gesamtplan



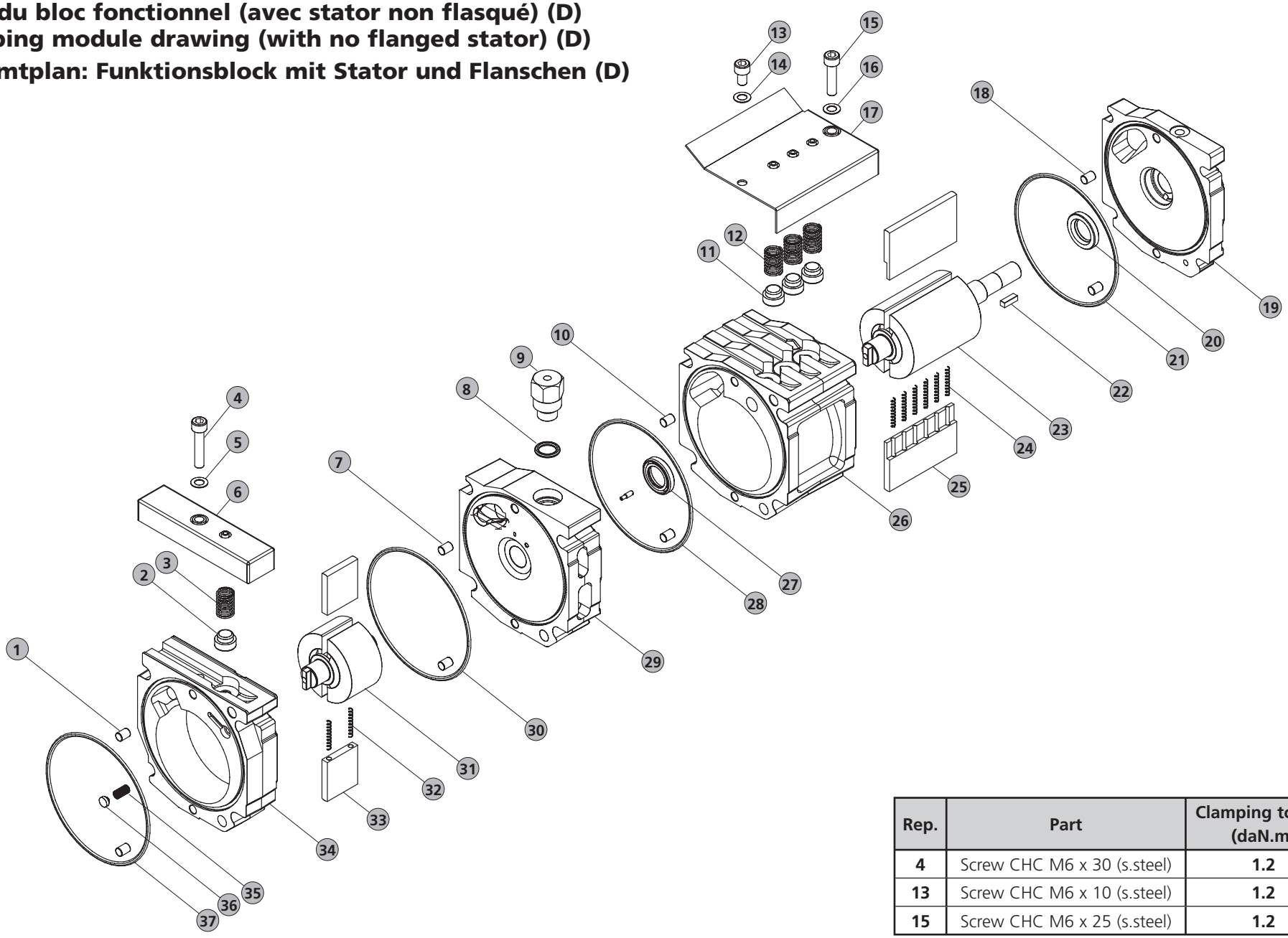

| Rep. | Part | Clamping torque (daN.m) |
|---|---|---|
| **2** | Screw FHC M5 x 10 | **0.4** |
| **9** | Screw CHC M6 x 25 | **1.2** |
| **14 / 20** | Screw FHC M6 x 12 | **1** |
| **28** | Screw M5 x 16 (s.steel) | **0.6** |
| **38** | Screw CHC M6 x 12 | **1.1** |
| **45** | Screw CHC M6 x 25 | **1.2** |
| **52 / 57** | Screw CHC M4 x 10 | **0.4** |

# Nomenclature cuve et bâti / Oil casing and central housing part list / Ölbehälter und Pumpenträger Nomenklatur

| REP | DÉSIGNATION | SPECIFICATION | BENENNUNG | Types/model | | | | | | | | | | | | | | | | | REF. P/N Bestell. Nr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2005 I | 2010 I | 2015 I | 2021 I | 2005 SD | 2005 SDI | 2010 SD | 2015 SD | 2021 SD | 1005 SD | 1015 SD | 2010 C2 | 2015 C2 | 2021 C2 | 2005 C1 | 2010 C1 | 2015 C1 | 2021 C1 | |
| 23 | Poignée | Handle | Griff | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103342** |
| 26 | Rondelle | Washer | Unterlegscheibe | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **065107** |
| 28 | Vis à collerette M5 x 16 | Screw M5 x 16 | Schraube M5 x 16 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ✣ |
| 33 | Manchon ventilateur | Fan coupling | Ventilator Kupplungshälfte | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103386** |
| 34 | Rondelle d'appui | Washer | Unterlegscheibe | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **065847** |
| 35 | Joint torique c 2,7 - d 12,1 Bague R1O | O-ring c 2.7 - d 12.1 - Ring R1O | Dichtung c 2,7 - d 12,1 - Ring R1O | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 36 | Bague épaulée | Shouldered ring | Abnutzungring | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **065823** |
| 37 | Idem 10 | Idem 10 | Ebenso 10 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | ✣ |
| 38 | Vis CHC M6 x 12 | Screw CHC M6 x 12 | Schraube CHC M6 x 12 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ✣ |
| 39 | Porte joint | Seal holder | Lippendichtung-sockel | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **065744** |
| 40 | Joint à lèvre 15 x 25,5 x 4,6 FMP81 | Shaft seal 15 x 25.5 x 4.6 FMP81 | Lippendichtung 15 x 25,5 x 4,6 FMP81 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● ✱ |
| 41 | Feutre | Felt | Filz | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 41a | Joint torique c 3,6-d 34,1 | O-ring c 3.6-d 34.1 | Dichtung c 3,6 - d 34,1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● ✱ |
| 42 | Bâti équipé | Equipped central housing | Pumpenträger einrichtet | 1 | 1 | 1 | 1 | | | | | | | 1 | | | | | | | | **103384S** |
| 42 | Bâti équipé | Equipped central housing | Pumpenträger einrichtet | | | | | 1 | | 1 | 1 | 1 | 1 | | | | | | | | | **103385S** |
| 42 | Bâti équipé | Equipped central housing | Pumpenträger einrichtet | | | | | | 1 | | | | | | | | | | | | | **105834S** |
| 42 | Bâti équipé | Equipped central housing | Pumpenträger einrichtet | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **105832S** |
| 43 | Socle | Base | Fuss | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **108712** |
| 43a | Amortisseur | Shock mount | Schwingunsdämpferm | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | 4/4 | **065790** |
| 44 | Idem 10 | Idem 10 | Ebenso 10 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | 2/8 | ✣ |
| 45 | Idem 9 | Idem 9 | Ebenso 9 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | 2/6 | ✣ |
| 46 | Tube lest d'air | Gas ballast tube | Gasballasttrohr | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **104631** |
| 46 | Tube lest d'air | Gas ballast tube | Gasballasttrohr | | | | | | | | | | 1 | | | | | | | | | **065842** |
| 46 | Tube lest d'air | Gas ballast tube | Gasballasttrohr | | | | | | | | | | | 1 | | | | | | | | **065839** |
| 47 | Joint torique c 1,9 - d 5,7 Bague R5 | O-ring c 1.9 - d 5.7 - Ring R5 | Dichtung c 1,9 - d 5,7 - Ring R5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ● |
| 48 | Joint torique c 3 - d 28 | O-ring c 3 - d 28 | Dichtung c 3 - d 28 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 49 | Traversée de cuve | Oil case feedthrough | Ölbehälterdurchfuhrung | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | **102853** |
| 49 | Traversée de cuve | Oil case feedthrough | Ölbehälterdurchfuhrung | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | **102852** |
| 49 | Traversée de cuve | Oil case feedthrough | Ölbehälterdurchfuhrung | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **100952** |
| 52 | Vis M4 x 10 | Screw M4 x 10 | Schraube M4 x 10 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | ✣ |
| 53 | Manchon lest d'air | Gas ballast sleeve | Gasballastmuffe | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 54 | Ressort lest d'air | Gas ballast spring | Gasballastfeder | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | 1 | 1 | 1 | 1 | ■ |
| 55 | Bouchon de manoeuvre | Gas ballast knob | Gasballastknopf | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | 1 | 1 | 1 | 1 | **102846** |
| 55 | Bouchon de manoeuvre | Gas ballast knob | Gasballastknopf | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | **102845** |
| 57 | Idem 52 | Idem 52 | Ebenso 52 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | ✣ |
| 58 | Couvercle lest d'air | Gas ballast cover | Gasballastdeckel | 1 | 1 | 1 | 1 | | | | | | | | | | | 1 | 1 | 1 | 1 | **107789** |
| 58 | Couvercle lest d'air | Gas ballast cover | Gasballastdeckel | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | **107790** |
| 58 | Couvercle lest d'air | Gas ballast cover | Gasballastdeckel | | | | | | | | | | | | 1 | 1 | 1 | | | | | **107792** |
| 59 | Idem 8 | Idem 8 | Ebenso 8 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | ■ |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✣ Lot visserie / Screw kit / Schraubensatz ❍ Lot palettes / Vane kit / Schieberssatz ✱ Kit joint avant / Front seal kit / Dichtungssatz

# Plan du bloc fonctionnel (avec stator non flasqué) (D)
# Pumping module drawing (with no flanged stator) (D)
# Gesamtplan: Funktionsblock mit Stator und Flanschen (D)




| Rep. | Part | Clamping torque (daN.m) |
|---|---|---|
| **4** | Screw CHC M6 x 30 (s.steel) | **1.2** |
| **13** | Screw CHC M6 x 10 (s.steel) | **1.2** |
| **15** | Screw CHC M6 x 25 (s.steel) | **1.2** |

## Nomenclature du bloc fonctionnel (avec stator non flasqué) (D)

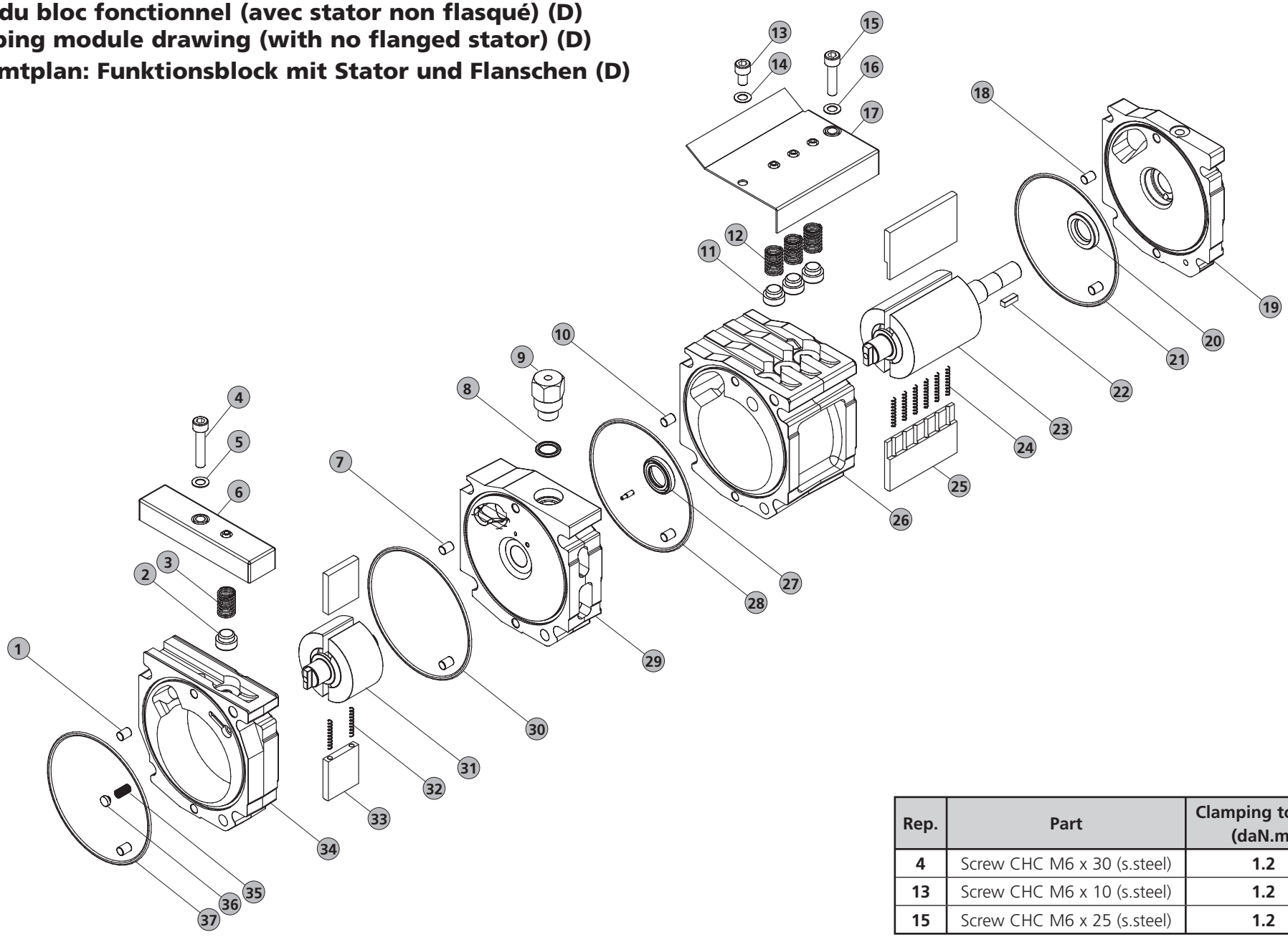
## Pumping module list (with no flanged stator) (D)

## Nomenklatur: Funktionsblock mit Stator und Flanschen (D)

| REP | DÉSIGNATION | SPECIFICATION | BENENNUNG | Types/model | | | | | | | | | | | | | | | | | | REF. P/N Bestell. Nr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2005 I | 2010 I | 2015 I | 2021 I | 2005 SD | 2005 SDI | 2010 SD | 2015 SD | 2021 SD | 1005 SD | 1015 SD | 2010 C2 | 2015 C2 | 2021 C2 | 2005 C1 | 2010 C1 | 2015 C1 | 2021 C1 | |
| 1 | Goupille D6 LG8 | Centering pin D6 LG8 | Zentrierstift | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | | | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ■ |
| 2 | Soupape | Valve | Auslassventil | 1 | 1/3 | 1/4 | 1/4 | 1 | 1 | 1/3 | 1/4 | 1/4 | | | 1/3 | 1/4 | 1/4 | 1/2 | 1/3 | 1/4 | 1/4 | ● |
| 3 | Ressort de soupape | Valve spring | Ventilfeder | 1 | 1/3 | 1/4 | 1/4 | 1 | 1 | 1/3 | 1/4 | 1/4 | | | 1/3 | 1/4 | 1/4 | 1/2 | 1/3 | 1/4 | 1/4 | ■ |
| 4 | Vis CHC M6 x 30 | Screw CHC M6 x 30 | Schraube CHC M6 x 30 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ✜ |
| 5 | Rondelle | Washer | Unterlegscheibe | 1 | 1/2 | 1/2 | 1/2 | 1 | 1 | 1/2 | 1/2 | 1/2 | | | 1/2 | 1/2 | 1/2 | 1 | 1/2 | 1/2 | 1/2 | ✜ |
| 6 | Capot de soupape HP | Valve cover HP | Ventilgehäusedeckel HD | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103521** |
| 6 | Capot de soupape HP | Valve cover HP | Ventilgehäusedeckel HD | | | | | | 1 | | | | | | | | | | | | | **A328571** |
| 7 | Idem 1 | Idem 1 | Ebenso 1 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | | | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ■ |
| 8 | Joint torique c 2,7 - d 12,1 - Bague R9 | O-ring c 2.7 - d 12.1 - Ring R9 | Dichtung c 2,7 - d 12,1 - Ring R9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 9 | Bouchon support capot | Cover holder | Gehäusedeckelhalter | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103544** |
| 10 | Idem 1 | Idem 1 | Ebenso 1 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/2 | 1/2 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ■ |
| 11 | Idem 2 | Idem 2 | Ebenso 2 | | 2/3 | 3/4 | 3/4 | | | 2/3 | 3/4 | 3/4 | 1 | 3 | 2/3 | 3/4 | 3/4 | 1/2 | 2/3 | 3/4 | 3/4 | ● |
| 12 | Idem 3 | Idem 3 | Ebenso 3 | | 2/3 | 3/4 | 3/4 | | | 2/3 | 3/4 | 3/4 | 1 | 3 | 2/3 | 3/4 | 3/4 | 1/2 | 2/3 | 3/4 | 3/4 | ■ |
| 13 | Vis CHC M6 x 10 | Screw CHC M6 x 10 | Schraube CHC M6 x 10 | | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | ✜ |
| 14 | Rondelle | Washer | Unterlegscheibe | | 1/2 | 1/2 | 1/2 | | | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | | 1/2 | 1/2 | 1/2 | ✜ |
| 15 | Vis CHC M6 x 25 | Screw CHC M6 x 25 | Schraube CHC M6 x 25 | | 1 | 1 | 1 | | | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | | 1 | 1 | 1 | ✜ |
| 16 | Rondelle | Washer | Unterlegscheibe | | 1/3 | 1/3 | 1/3 | | | 1/3 | 1/3 | 1/3 | 1/2 | 2/2 | 1/3 | 1/3 | 1/3 | | 1/3 | 1/3 | 1/3 | ✜ |
| 17 | Capot de soupape BP | Valve cover LP | Ventilgehäusedeckel ND | | 1 | | | | | 1 | | | | | 1 | | | | 1 | | | **103523** |
| 17 | Capot de soupape BP | Valve cover LP | Ventilgehäusedeckel ND | | | 1 | | | | | 1 | | | | | 1 | | | | 1 | | **103525** |
| 17 | Capot de soupape BP | Valve cover LP | Ventilgehäusedeckel ND | | | | 1 | | | | | 1 | | | | | 1 | | | | 1 | **103394** |
| 18 | Idem 1 | Idem 1 | Ebenso 1 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/2 | 1/2 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ■ |
| 19 | Flasque avant assemblé | Equipped front plate | Einrichtet vorderer Flansche | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | **103401S** |
| 19 | Flasque avant assemblé | Equipped front plate | Einrichtet vorderer Flansche | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103396S** |
| 20 | Joint à lèvre 15 x 25,5 x 4,6 | Shaft seal 15 x 25.5 x 4.6 | Lippendichtung 15 x 25,5 x 4,6 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1 | 1 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | ● |
| 21 | Joint torique c 2 - d 90 | O-ring c 2 - d 90 | Dichtung c 2 - d 90 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/2 | 1/2 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ● |
| 22 | Clavette Parallèle A4 x 4 x 12 | Shaft key A4 x 4 x 12 | Nutenstein A4 x 4 x 12 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ■ |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | 1 | | | | 1 | 1 | | | | | | | | | | | | | **065745S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | 1 | | | | | 1 | | | | | | | | | | | | **065749S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | 1 | | | | | 1 | | | | | | | | | | | **065750S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | 1 | | | | | 1 | | | | | | | | | | **065751S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | 1 | | | | | | | | | **103880S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | 1 | | | | | | | | **103569S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | | 1 | | | | 1 | | | **065801S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | | | 1 | | | | 1 | | **065802S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | | | | 1 | | | | 1 | **065803S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | | | | | 1 | | | | **065601S** |
| 24 | Ressort de palette | Vane spring | Schieberfeder | 2/4 | 4/6 | 6/8 | 6/8 | 2/4 | 2/4 | 4/6 | 6/8 | 6/8 | 2 | 6 | 4/6 | 6/8 | 6/8 | 2/4 | 4/6 | 6/8 | 6/8 | ■❍ |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✜ Lot visserie / Screw kit / Schraubensatz ❍ Lot palettes / Vane kit / Schieberssatz ✱ Kit joint avant / Front seal kit / Dichtungssatz

# Plan du bloc fonctionnel (avec stator non flasqué) (D)
# Pumping module drawing (with no flanged stator) (D)
# Gesamtplan: Funktionsblock mit Stator und Flanschen (D)




| Rep. | Part | Clamping torque (daN.m) |
|---|---|---|
| **4** | Screw CHC M6 x 30 (s.steel) | **1.2** |
| **13** | Screw CHC M6 x 10 (s.steel) | **1.2** |
| **15** | Screw CHC M6 x 25 (s.steel) | **1.2** |

## Nomenclature du bloc fonctionnel (avec stator non flasqué) (D)

## Pumping module list (with no flanged stator) (D)

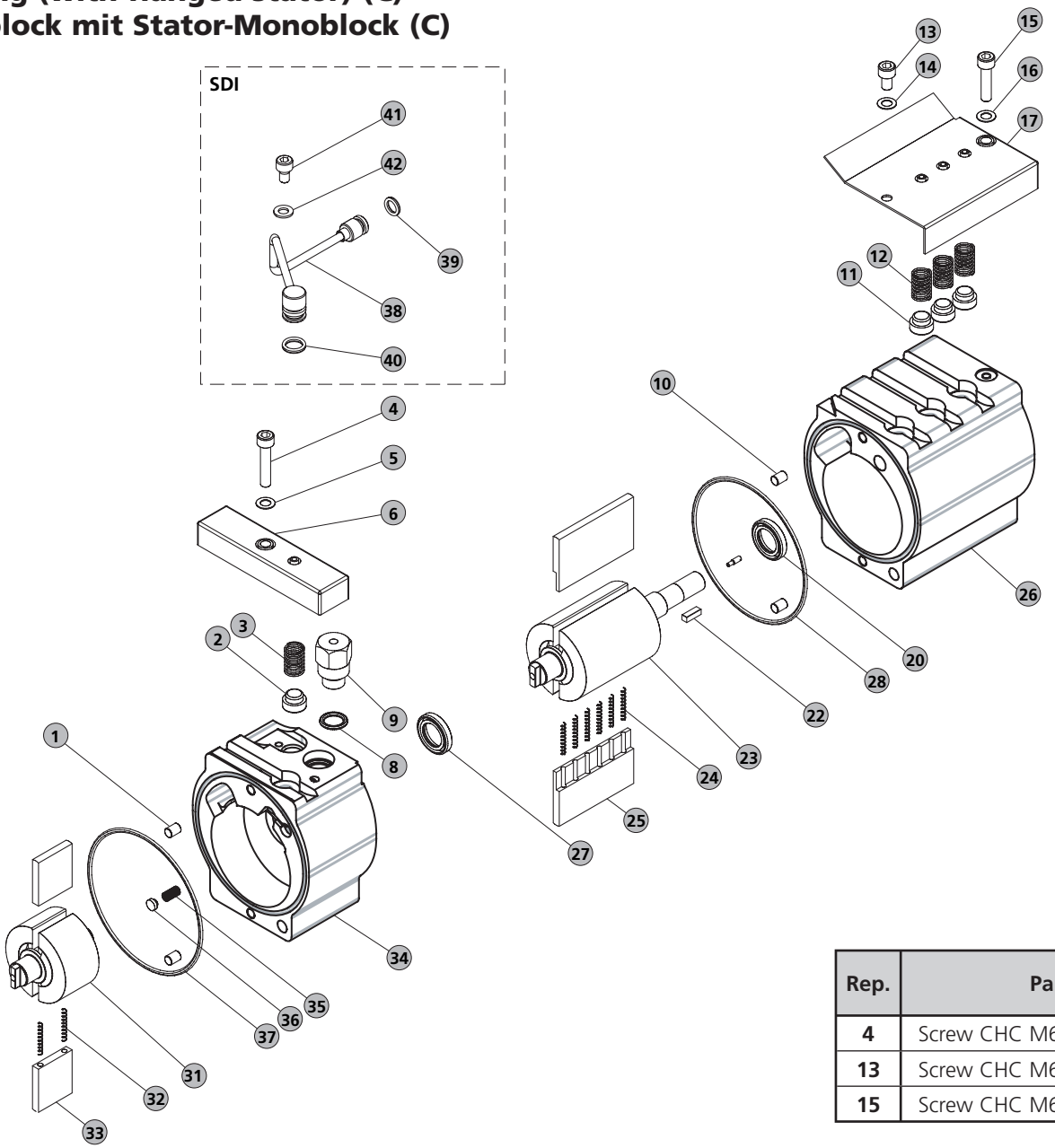
## Nomenklatur: Funktionsblock mit Stator und Flanschen (D)

| REP | DÉSIGNATION | SPECIFICATION | BENENNUNG | Types/model | | | | | | | | | | | | | | | | | | REF. P/N Bestell. Nr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2005 I | 2010 I | 2015 I | 2021 I | 2005 SD | 2005 SDI | 2010 SD | 2015 SD | 2021 SD | 1005 SD | 1015 SD | 2010 C2 | 2015 C2 | 2021 C2 | 2005 C1 | 2010 C1 | 2015 C1 | 2021 C1 | |
| 25 | Palette BP | LP vane | Niederdruckschieber | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ■❍ |
| 26 | Stator BP | LP stator | Niederdruckstator | 1 | | | | 1 | 1 | | | | | | | | | 1 | | | | **103507S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | 1 | | | | | 1 | | | | | 1 | | | | 1 | | | **103512S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | 1 | | | | | 1 | | | | | 1 | | | | 1 | | **103510S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | 1 | | | | | 1 | | | | | 1 | | | | 1 | **103393S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | | | | | | | 1 | | | | | | | | | **103409S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | | | | | | | | 1 | | | | | | | | **103882** |
| 27 | Idem 20 | Idem 20 | Ebenso 20 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | | | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | ● |
| 28 | Idem 21 | Idem 21 | Ebenso 21 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/2 | 1/2 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ● |
| 29 | Flasque médian | Central plate | Zwischenflansche | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | | | | | | | | | | **103408S** |
| 29 | Flasque médian | Central plate | Zwischenflansche | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103410S** |
| 29 | Flasque médian | Central plate | Zwischenflansche | | | | | | 1 | | | | | | | | | | | | | **105639** |
| 30 | Idem 21 | Idem 21 | Ebenso 21 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | | | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ● |
| 31 | Rotor HP | HP rotor | Hochdruckrotor | | | | | | 1 | | | | | | | | | | | | | **065853** |
| 31 | Rotor HP | HP rotor | Hochdruckrotor | | | | | 1 | | 1 | 1 | 1 | | | | | | | | | | **065852S** |
| 31 | Rotor HP | HP rotor | Hochdruckrotor | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | **103417S** |
| 31 | Rotor HP | HP rotor | Hochdruckrotor | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **102854S** |
| 32 | Idem 24 | Idem 24 | Ebenso 24 | 2/4 | 2/6 | 2/8 | 2/8 | 2/4 | 2/4 | 2/6 | 2/8 | 2/8 | | | 2/6 | 2/8 | 2/8 | 2/4 | 2/6 | 2/8 | 2/8 | ■❍ |
| 33 | Palette HP | HP vane | Hochdruckschieber | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ■❍* |
| 34 | Stator HP | HP stator | Hochdruckstator | | | | | | 1 | | | | | | | | | | | | | **065722S** |
| 34 | Stator HP | HP stator | Hochdruckstator | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103409S** |
| 35 | Ressort clapet anti-retour | Spring of the antisuck-back | Federrückschlagventil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ■ |
| 36 | Clapet anti-retour | Antisuck-back device | Rückschlagventil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **065798** |
| 37 | Idem 21 | Idem 21 | Ebenso 21 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | | | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ● |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✜ Lot visserie / Screw kit / Schraubensatz ❍ Lot palettes / Vane kit / Schieberssatz ✱ Kit joint avant / Front seal kit / Dichtungssatz

* sauf C2 / except C2 / ausgemomen C2

# Plan du bloc fonctionnel (avec stator flasqué) (C)
# Pumping module drawing (with flanged stator) (C)
# Gesamtplan: Funktionsblock mit Stator-Monoblock (C)




| Rep. | Part | Clamping torque (daN.m) |
|---|---|---|
| **4** | Screw CHC M6 x 30 (s.steel) | **1.2** |
| **13** | Screw CHC M6 x 10 (s.steel) | **1.2** |
| **15** | Screw CHC M6 x 25 (s.steel) | **1.2** |

## Nomenclature du bloc fonctionnel (avec stator flasqué) (C)

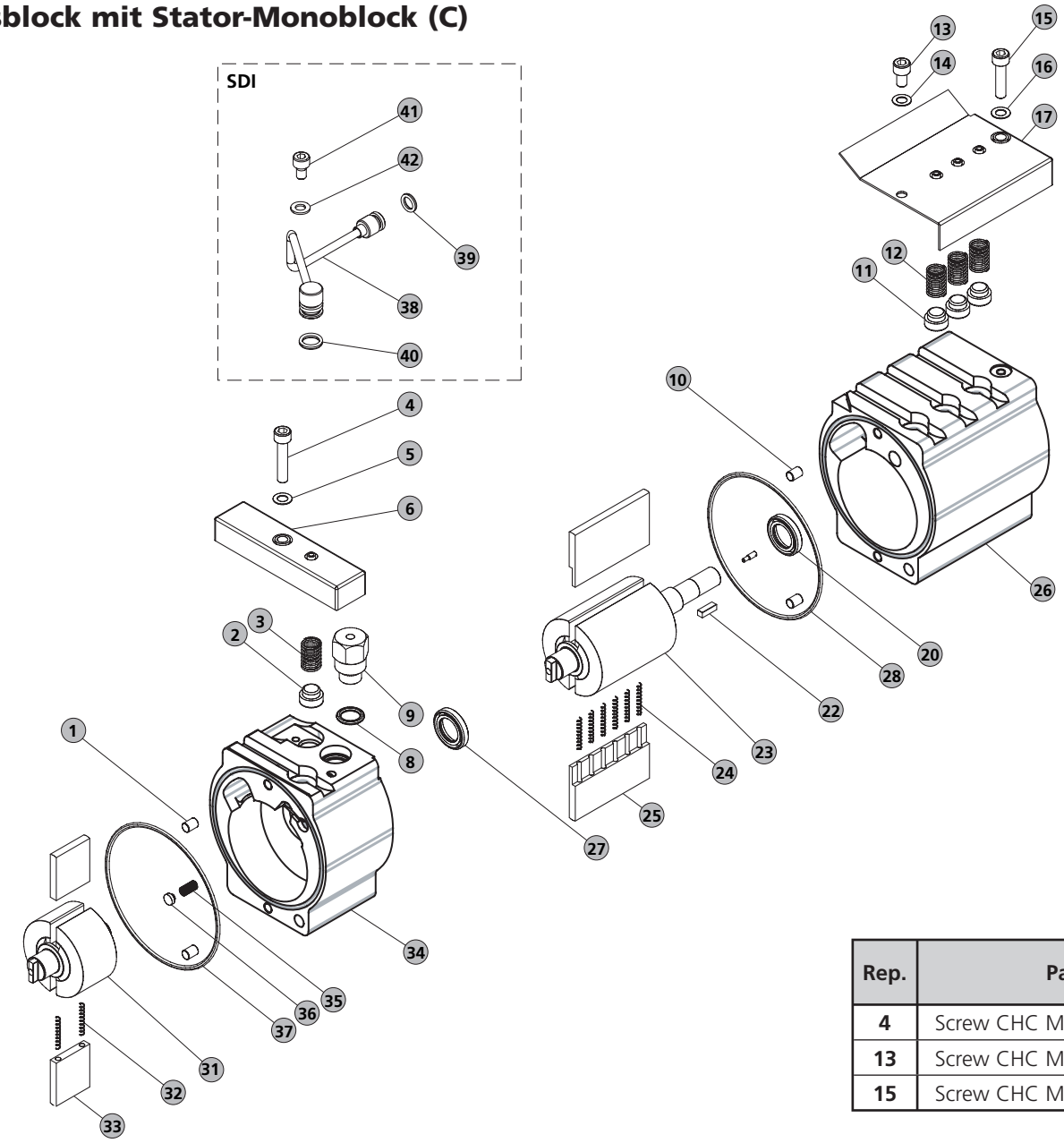
## Pumping module list (with flanged stator) (C)

## Nomenklatur: Funktionsblock mit Stator-Monoblock (C)

| REP | DÉSIGNATION | SPECIFICATION | BENENNUNG | Types/model | | | | | | | | | | | | | | | | | | REF. P/N Bestell. Nr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2005 I | 2010 I | 2015 I | 2021 I | 2005 SD | 2005 SDI | 2010 SD | 2015 SD | 2021 SD | 1005 SD | 1015 SD | 2010 C2 | 2015 C2 | 2021 C2 | 2005 C1 | 2010 C1 | 2015 C1 | 2021 C1 | |
| 1 | Goupille D6 LG8 | Centering pin D6 LG8 | Zentrierstift | 1/4 | 1/4 | 1/4 | 1/5 | 1/5 | 1/5 | 1/5 | 1/4 | 1/4 | | | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/5 | 1/5 | ■ |
| 2 | Soupape | Valve | Auslassventil | 1 | 1/3 | 1/4 | 1/4 | 1 | 1 | 1/3 | 1/4 | 1/4 | | | 1/3 | 1/4 | 1/4 | 1/2 | 1/3 | 1/4 | 1/4 | ● |
| 3 | Ressort de soupape | Valve spring | Ventilfeder | 1 | 1/3 | 1/4 | 1/4 | 1 | 1 | 1/3 | 1/4 | 1/4 | | | 1/3 | 1/4 | 1/4 | 1/2 | 1/3 | 1/4 | 1/4 | ■ |
| 4 | Vis CHC M6 x 30 | Screw CHC M6 x 30 | Schraube CHC M6 x 30 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ✣ |
| 5 | Rondelle | Washer | Unterlegscheibe | 1 | 1/2 | 1/2 | 1/2 | 1 | 1 | 1/2 | 1/2 | 1/2 | | | 1/2 | 1/2 | 1/2 | 1 | 1/2 | 1/2 | 1/2 | ✣ |
| 6 | Capot de soupape HP | Valve cover HP | Ventilgehäusedeckel HD | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **A332166** |
| 6 | Capot de soupape HP | Valve cover HP | Ventilgehäusedeckel HD | | | | | | | | | | | 1 | | | | | | | | **A332900** |
| 8 | Joint torique c 2,7 - d 12,1 - Bague R9 | O-ring c 2.7 - d 12.1 - Ring R9 | Dichtung c 2,7 - d 12,1 - Ring R9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 9 | Bouchon support capot | Cover holder | Gehäusedeckelhalter | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103544** |
| 10 | Idem 1 | Idem 1 | Ebenso 1 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/2 | 1/2 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ■ |
| 11 | Idem 2 | Idem 2 | Ebenso 2 | | 2/3 | 3/4 | 3/4 | | | 2/3 | 3/4 | 3/4 | 1 | 3 | 2/3 | 3/4 | 3/4 | 1/2 | 2/3 | 3/4 | 3/4 | ● |
| 12 | Idem 3 | Idem 3 | Ebenso 3 | | 2/3 | 3/4 | 3/4 | | | 2/3 | 3/4 | 3/4 | 1 | 3 | 2/3 | 3/4 | 3/4 | 1/2 | 2/3 | 3/4 | 3/4 | ■ |
| 13 | Vis CHC M6 x 10 | Screw CHC M6 x 10 | Schraube CHC M6 x 10 | | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | ✣ |
| 14 | Rondelle | Washer | Unterlegscheibe | | 1/2 | 1/2 | 1/2 | | | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | | 1/2 | 1/2 | 1/2 | ✣ |
| 15 | Vis CHC M6 x 25 | Screw CHC M6 x 25 | Schraube CHC M6 x 25 | | 1 | 1 | 1 | | | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | | 1 | 1 | 1 | ✣ |
| 16 | Rondelle | Washer | Unterlegscheibe | | 1/3 | 1/3 | 1/3 | | | 1/3 | 1/3 | 1/3 | 1/2 | 2/2 | 1/3 | 1/3 | 1/3 | | 1/3 | 1/3 | 1/3 | ✣ |
| 17 | Capot de soupape BP | Valve cover LP | Ventilgehäusedeckel ND | | 1 | | | | | 1 | | | | | 1 | | | | 1 | | | **A332176** |
| 17 | Capot de soupape BP | Valve cover LP | Ventilgehäusedeckel ND | | | 1 | | | | | 1 | | | | | 1 | | | | 1 | | **A332266** |
| 17 | Capot de soupape BP | Valve cover LP | Ventilgehäusedeckel ND | | | | 1 | | | | | 1 | | | | | 1 | | | | 1 | **A332175** |
| 20 | Joint à lèvre 15 x 25,5 x 4,6 | Shaft seal 15 x 25.5 x 4.6 | Lippendichtung 15 x 25,5 x 4,6 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1 | 1 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | ● |
| 22 | Clavette Parallèle A4 x 4 x 12 | Shaft key A4 x 4 x 12 | Nutenstein A4 x 4 x 12 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ■ |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | 1 | | | | 1 | 1 | | | | | | | | | | | | | **065745S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | 1 | | | | | 1 | | | | | | | | | | | | **065749S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | 1 | | | | | 1 | | | | | | | | | | | **065750S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | 1 | | | | | 1 | | | | | | | | | | **065751S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | 1 | | | | | | | | | **103880S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | 1 | | | | | | | | **103569S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | | | | | | | | | **103568S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | | 1 | | | | 1 | | | **065801S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | | | 1 | | | | 1 | | **065802S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | | | | 1 | | | | 1 | **065803S** |
| 23 | Rotor BP | LP rotor | Niederdruckrotor | | | | | | | | | | | | | | | 1 | | | | **065601S** |
| 24 | Ressort de palette | Vane spring | Schieberfeder | 2/4 | 4/6 | 6/8 | 6/8 | 2/4 | 2/4 | 4/6 | 6/8 | 6/8 | 2 | 6 | 4/6 | 6/8 | 6/8 | 2/4 | 4/6 | 6/8 | 6/8 | ■❍ |
| 25 | Palette BP | LP vane | Niederdruckschieber | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ■❍ |
| 26 | Stator BP | LP stator | Niederdruckstator | 1 | | | | 1 | 1 | | | | | | | | | | | | | **A006001S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | 1 | | | | | 1 | | | | | | | | | | | | **A006000S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | 1 | | | | | 1 | | | | | | | | | | | **A005999S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | 1 | | | | | 1 | | | | | | | | | | **A005997S** |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✣ Lot visserie / Screw kit / Schraubensatz ❍ Lot palettes / Vane kit / Schieberssatz ✱ Kit joint avant / Front seal kit / Dichtungssatz

# Plan du bloc fonctionnel (avec stator flasqué) (C)
# Pumping module drawing (with flanged stator) (C)
# Gesamtplan: Funktionsblock mit Stator-Monoblock (C)




| Rep. | Part | Clamping torque (daN.m) |
|---|---|---|
| **4** | Screw CHC M6 x 30 (s.steel) | **1.2** |
| **13** | Screw CHC M6 x 10 (s.steel) | **1.2** |
| **15** | Screw CHC M6 x 25 (s.steel) | **1.2** |

## Nomenclature du bloc fonctionnel (avec stator flasqué) (C)

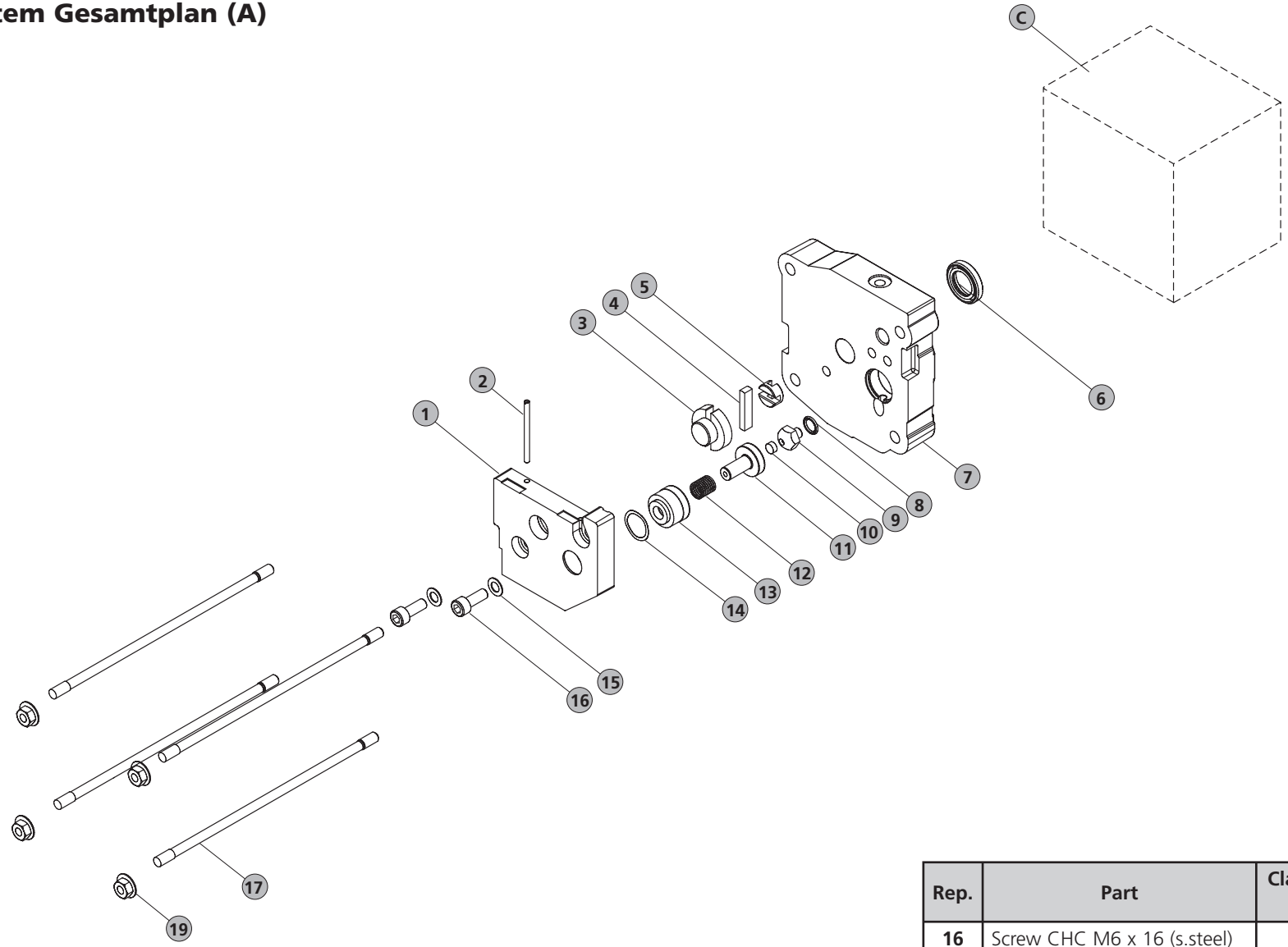
## Pumping module list (with flanged stator) (C)

## Nomenklatur: Funktionsblock mit Stator-Monoblock (C)

| REP | DÉSIGNATION | SPECIFICATION | BENENNUNG | Types/model | | | | | | | | | | | | | | | | | | REF. P/N Bestell. Nr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2005 I | 2010 I | 2015 I | 2021 I | 2005 SD | 2005 SDI | 2010 SD | 2015 SD | 2021 SD | 1005 SD | 1015 SD | 2010 C2 | 2015 C2 | 2021 C2 | 2005 C1 | 2010 C1 | 2015 C1 | 2021 C1 | |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | | | | | | | 1 | | | | | | | | | **A006465S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | | | | | | | | 1 | | | | | | | | **A006466S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | | | | | | | | | | | | 1 | | | | **A006037S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | | | | | | | | | 1 | | | | 1 | | | **A006038S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | | | | | | | | | | 1 | | | | 1 | | **A006039S** |
| 26 | Stator BP | LP stator | Niederdruckstator | | | | | | | | | | | | | | 1 | | | | 1 | **A006040S** |
| 27 | Idem 20 | Idem 20 | Ebenso 20 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | | | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | ● |
| 28 | Joint torique c 2 - d 90 | O-ring c 2 - d 90 | Dichtung c 2 - d 90 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1 | 1 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | ● |
| 31 | Rotor HP | HP rotor | Hochdruckrotor | | | | | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | **065852** |
| 31 | Rotor HP | HP rotor | Hochdruckrotor | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | **103417** |
| 31 | Rotor HP | HP rotor | Hochdruckrotor | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **102854** |
| 32 | Idem 24 | Idem 24 | Ebenso 24 | 2/4 | 2/6 | 2/8 | 2/8 | 2/4 | 2/4 | 2/6 | 2/8 | 2/8 | | | 2/6 | 2/8 | 2/8 | 2/4 | 2/6 | 2/8 | 2/8 | ■❍ |
| 33 | Palette HP | HP vane | Hochdruckschieber | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ■❍ |
| 34 | Stator HP | HP stator | Hochdruckstator | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | | | | | | | | | | **A005996S** |
| 34 | Stator HP | HP stator | Hochdruckstator | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **A006042S** |
| 34 | Stator HP | HP stator | Hochdruckstator | | | | | | 1 | | | | | | | | | | | | | **A006496S** |
| 35 | Ressort clapet anti-retour | Spring of the antisuck-back | Federrückschlagventil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ■ |
| 36 | Clapet anti-retour | Antisuck-back device | Rückschlagventil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **065798** |
| 37 | Idem 28 | Idem 28 | Ebenso 28 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | | | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | ● |
| 38 | Tube pompage | Sniffer pipe | Gaseinlassleitung | | | | | | 1 | | | | | | | | | | | | | **065627** |
| 39 | Joint torique c 1,9 - d 7,2 | O-ring c 1,9 - d 7,2 | Dichtung c 1,9 - d 7,2 | | | | | | 1 | | | | | | | | | | | | | ● |
| 40 | Joint torique c 1,9 - d 8,9 | O-ring c 1,9 - d 8,9 | Dichtung c 1,9 - d 8,9 | | | | | | 1 | | | | | | | | | | | | | ● |
| 41 | Vis CHC M5 x 8 | Screw CHC M5 x 8 | Schraube CHC M5 x 8 | | | | | | 1 | | | | | | | | | | | | | ✣ |
| 42 | Rondelle M5 | Washer M5 | Unterlegscheibe M5 | | | | | | 1 | | | | | | | | | | | | | ✣ |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✣ Lot visserie / Screw kit / Schraubensatz ❍ Lot palettes / Vane kit / Schieberssatz ✱ Kit joint avant / Front seal kit / Dichtungssatz

# Plan du système de lubrification pompe à huile (A)
# Oil pump system drawing (A)
# Ölpumpsystem Gesamtplan (A)




| Rep. | Part | Clamping torque (daN.m) |
|---|---|---|
| **16** | Screw CHC M6 x 16 (s.steel) | **1.2** |
| **17** | Pin (s.steel) | **1.4** |
| **19** | Nut HM6 (s.steel) | **1.4** |

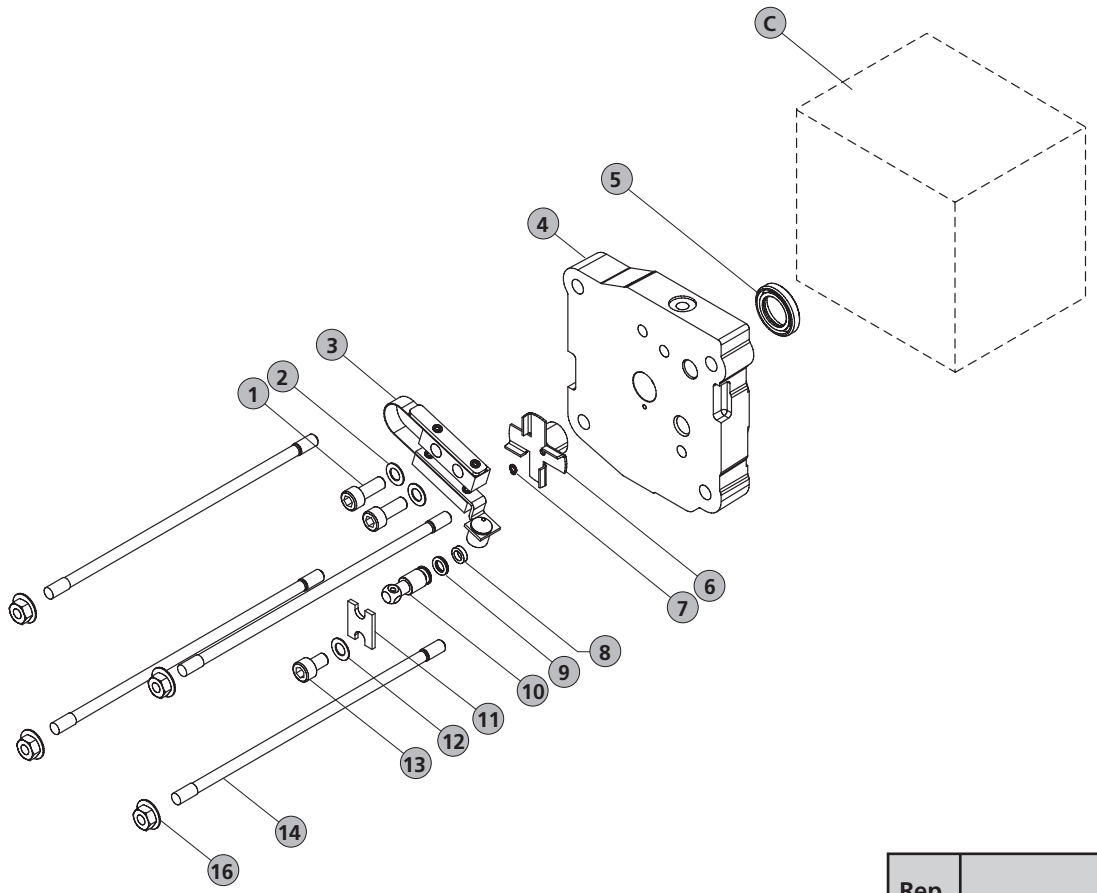
# Nomenclature du système de lubrification pompe à huile / Oil pump system part list / Ölpumpsystem Nomenklatur

| REP | DÉSIGNATION | SPECIFICATION | BENENNUNG | Types/model | | | | | | | | | | | | REF. P/N Bestell. Nr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2005 I | 2010 I | 2015 I | 2021 I | 1015 SD | 2010 C2 | 2015 C2 | 2021 C2 | 2005 C1 | 2010 C1 | 2015 C1 | 2021 C1 | |
| 1 | Couvercle pompe à huile | Oil pump cover | Ölpumpendeckel | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103416** |
| 2 | Tube entrée d'air | Air admission tube | Lufteinlass | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **104334** |
| 3 | Rotor pompe à huile | Oil pump rotor | Ölpumpenrotor | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103412** |
| 4 | Palette pompe à huile | Oil pump vane | Ölpumpenschieber | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ■❑ |
| 5 | Joint de oldham | Oldham coupling | Oldham-Kupplung | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103413** |
| 6 | Joint à lèvre 15 x 25,5 x 4,6 | Shaft seal 15 x 25.5 x 4.6 | Lippendichtung 15 x 25,5 x 4,6 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 7 | Flasque arrière | Rear plate | Hintererflansche | 1 | 1 | 1 | 1 | | | | | | | | | **103411S** |
| 7 | Flasque arrière | Rear plate | Hintererflansche | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103398S** |
| 8 | Joint torique c 1,5 - d 7,5 | O-ring c 1.5 - d 7.5 | Dichtung c 1,5 - d 7,5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 9 | Siège | Seat | Sitz | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **103389** |
| 10 | Clapet anti-retour | Antisuck-back device | Rückschlagventil | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 11 | Piston anti-retour | Antisuck-back piston | Kolber | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **102962** |
| 12 | Ressort d'étanchéité | Spring | Feder | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ■ |
| 13 | Cylindre anti-retour | Oil pump antisuck-back cylinder | Rückschlagzylinder | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **102963** |
| 14 | Rondelle élastique | Spring washer | Scheibe | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 15 | Rondelle | Washer | Unterlegscheibe | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ✜ |
| 16 | Vis CHC M6 x 16 | Screw CHC M6 x 16 | Schraube CHC M6 x 16 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | ✜ |
| 17 | Goujon M6-106 / 12 | Pin M6-106 / 12 | Stift M6-106 / 12 | | | | | 4 | | | | | | | | **103524** |
| 17 | Goujon M6-129 / 19 | Pin M6-129 / 19 | Stift M6-129 / 19 | 4 | | | | | | | | 4 | | | | **102855** |
| 17 | Goujon M6-142 / 12 | Pin M6-142 / 12 | Stift M6-142 / 12 | | 4 | | | | 4 | | | | 4 | | | **065806** |
| 17 | Goujon M6-164 / 12 | Pin M6-164 / 12 | Stift M6-164 / 12 | | | 4 | | | | 4 | | | | 4 | | **065805** |
| 17 | Goujon M6-187 / 12 | Pin M6-187 / 12 | Stift M6-187 / 12 | | | | 4 | | | | 4 | | | | 4 | **065804** |
| 19 | Ecrou à embase HM6 | Shoudered nut HM6 | Schraubenmutter HM6 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | ✜ |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✜ Lot visserie / Screw kit / Schraubensatz ❑ Lot palettes pompe à huile / Oil vane pump kit / Ölpumpenschieberssatz

## Sous-ensemble A / Subassembly A / Gesamtplan A

# Plan du système de lubrification levier moulinet (B)
# Oil system drawing (B)
# Flügenrad-Ölsystem Gesamtplan (B)




| Rep. | Part | Clamping torque (daN.m) |
|---|---|---|
| **1** | Screw CHC M6 x 16 (s.steel) | **1.2** |
| **13** | Screw CHC M6 x 10 (s.steel) | **1.2** |
| **14** | Pin (s.steel) | **1.4** |
| **16** | Nut (s.steel) | **1.4** |

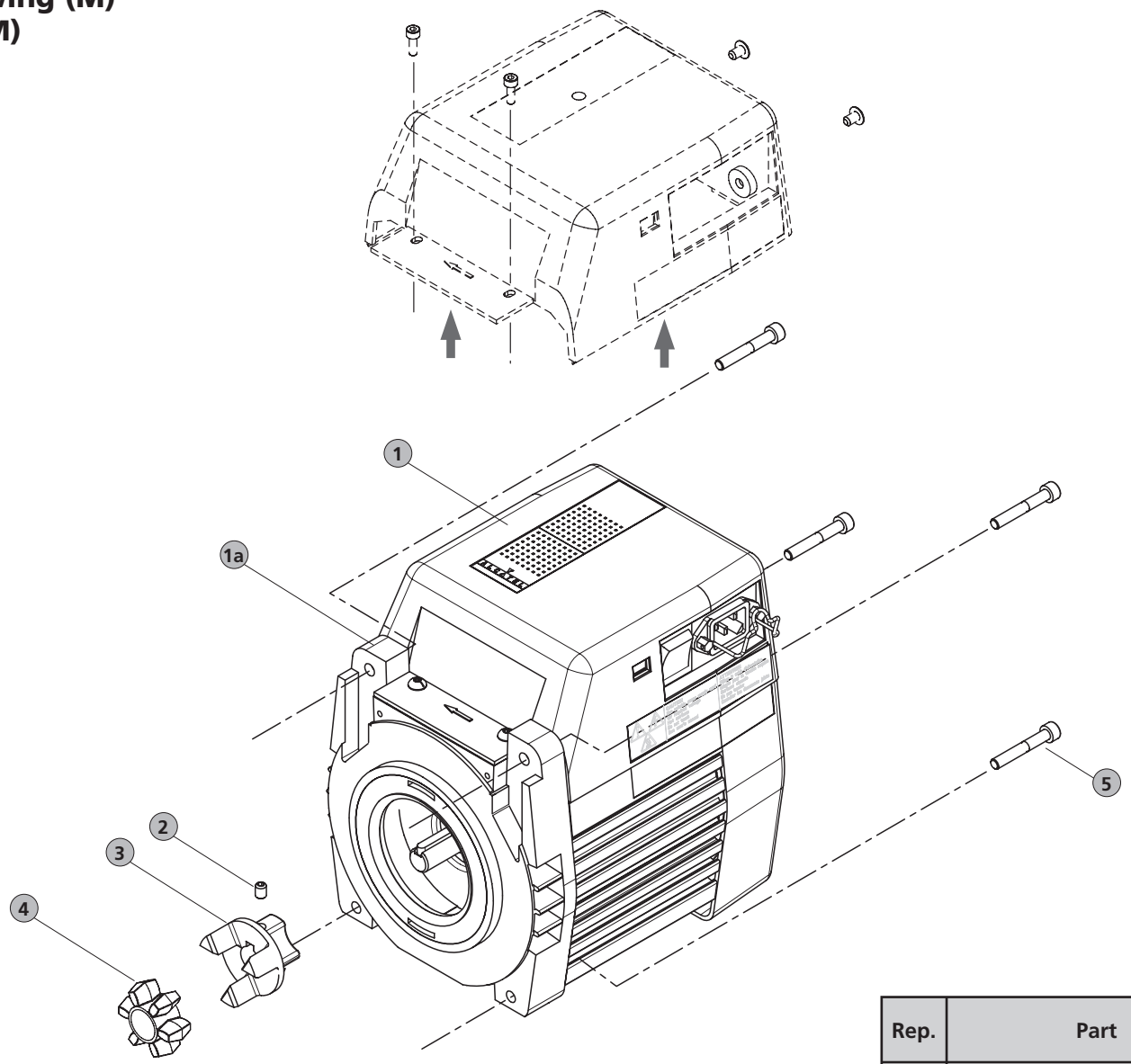
# Nomenclature du système de lubrification levier moulinet / Oilsystem part list / Flügenrad-Ölsystem Nomenklatur

| REP | DÉSIGNATION | SPECIFICATION | BENENNUNG | Types/model | | | | | | REF. P/N Bestell. Nr |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2005 SD | 2005 SDI | 2010 SD | 2015 SD | 2021 SD | 1005 SD | |
| 1 | Vis CHC M6 x 16 | Screw CHC M6 x 16 | Schraube CHC M6 x 16 | 2 | 2 | 2 | 2 | 2 | 2 | ✣ |
| 2 | Rondelle | Washer | Unterlegscheibe | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | 2/3 | ✣ |
| 3 | Levier oscillant | Equipped lever | Hebel | 1 | 1 | 1 | 1 | 1 | 1 | ■ |
| 4 | Flasque arrière | Rear plate | Hintererflansche | 1 | 1 | 1 | 1 | 1 | 1 | **103485S** |
| 5 | Joint à lèvre 15 x 25,5 x 4,6 | Shaft seal 15 x 25.5 x 4.6 | Lippendichtung 15 x 25,5 x 4,6 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 6 | Came moulinet | Impeller | Flügenrad | 1 | 1 | 1 | 1 | 1 | 1 | **052721** |
| 7 | Bague d'arrêt | Clips | Sprengring | 1 | 1 | 1 | 1 | 1 | 1 | ■ |
| 8 | Rondelle | Washer | Unterlegscheibe | 1 | | 1 | 1 | 1 | | **052758** |
| 8 | Gicleur | Jet | Düse | | | | | | 1 | **102910** |
| 8 | Gicleur | Jet | Düse | | 1 | | | | | **103314** |
| 9 | Joint torique c 1,9 - d 5,7 - Bague R5 | O-ring c 1.9 - d 5.7 - Ring R5 | Dichtung c 1,9 - d 5,7 - Ring R5 | 1 | 1 | 1 | 1 | 1 | 1 | ● |
| 10 | Siège de clapet | Seat | Ventilsitz | 1 | 1 | 1 | 1 | 1 | 1 | **052718** |
| 11 | Bride | Flange | Klammer | 1 | 1 | 1 | 1 | 1 | 1 | **052569** |
| 12 | Idem 2 | Idem 2 | Ebenso 2 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | ✣ |
| 13 | Vis CHC M6 x 10 | Screw CHC M6 x 10 | Schraube CHC M6 x 10 | 1 | 1 | 1 | 1 | 1 | 1 | ✣ |
| 14 | Goujon M6-129 / 19 | Pin M6-129 / 19 | Stift M6-129 / 19 | 4 | 4 | | | | | **102855** |
| 14 | Goujon M6-142 / 12 | Pin M6-142 / 12 | Stift M6-142 / 12 | | | 4 | | | | **065806** |
| 14 | Goujon M6-164 / 12 | Pin M6-164 / 12 | Stift M6-164 / 12 | | | | 4 | | | **065805** |
| 14 | Goujon M6-187 / 12 | Pin M6-187 / 12 | Stift M6-187 / 12 | | | | | 4 | | **065804** |
| 14 | Goujon M6-72 / 19 | Pin M6-72 / 19 | Stift M6-72 / 19 | | | | | | 4 | **065636** |
| 14 | Goujon M6-84 / 12 | Pin M6-84 / 12 | Stift M6-84 / 12 | | | | | | | **103524** |
| 16 | Ecrou à embase HM6 | Shoudered nut HM6 | Schraubenmutter HM6 | 4 | 4 | 4 | 4 | 4 | 4 | ✣ |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✣ Lot visserie / Screw kit / Schraubensatz

## Sous-ensemble B / Subassembly B / Gesamtplan B

# Plan ensemble motorisation (M)
# Motor assembly drawing (M)
# Motor Gesamtplan (M)




| Rep. | Part | Clamping torque (daN.m) |
|---|---|---|
| **5** | Screw CHc M6 x 40 (s.steel) | **1.1** |
| **2** | Screw Hc M6 x 8.8 (s.steel) | **0.8** |

# Nomenclature ensemble motorisation (M) / Motor assembly part list (M) / Motor Gesamtheit Nomenklatur (M)

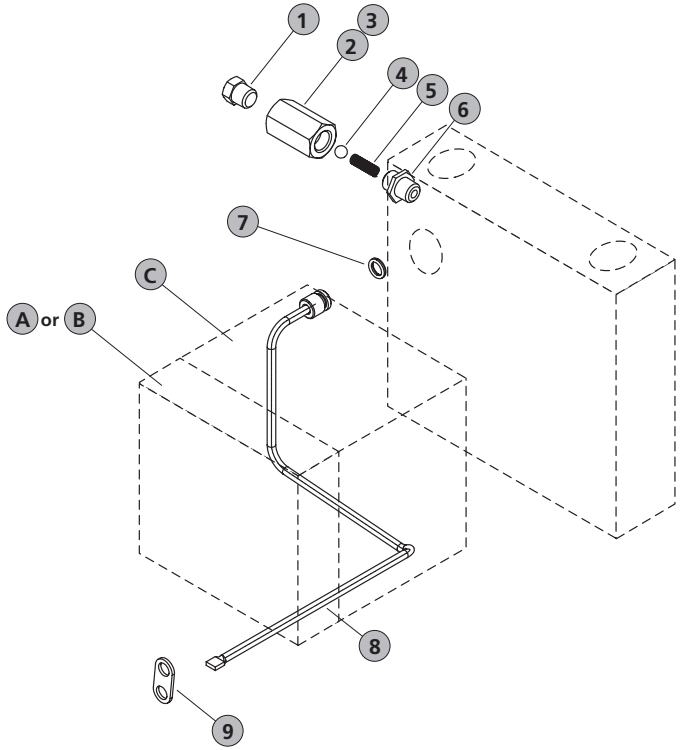
| MOTEUR UNIVERSEL / UNIVERSAL MOTOR / UNIVERSELLE MOTOR | | | | | |
|---|---|---|---|---|---|
| **REP** | **DÉSIGNATION** | **SPECIFICATION** | **BENENNUNG** | **Qty** | **REF. P/N Bestell. Nr** |
| 1 | Moteur monophasé standard avec interrupteur* | Single phase motor with on/off switch* | Wechselstrommotor* mit Shalter | 1 | **108694** |
| 1 | Moteur monophasé sans interrupteur* | Single phase motor without switch* | Wechselstrommotor* ohne Shalter* | 1 | **108698** |
| 1 | Moteur triphasé standard | Three-phase motor | Drehstrommotor | 1 | **108695** |
| 1 | Moteur monophasé Japon avec interrupteur* | Japanese single phase motor with on/off switch* | Japan-Wechselstrommotor* mit Shalter | 1 | **107878** |
| 1a | Kit d'adaptation pour moteur bride CEI (bride CEI + vis + 1/2 manchon + intercalaire) | CEI flange motor coupling kit (CEI flange + screw +motor side coupling+ plastic coupling) | CEI Klammer Motorflanschssatz (Klammer Motorflanschssatz + Schraube +Kupplugshälfte + Küpplungsstern) | 1 | **104558** |
| 1b | Kit d'adaptation pour moteur bride Nema (bride Nema + vis + 1/2 manchon US + intercalaire) | Nema flange motor coupling kit (Nema flange + screw +US motor side coupling+ plastic coupling) | Nema Klammer Motorflanschssatz (Klammer Motorflanschssatz + Schraube +US Kupplugshälfte + Küpplungsstern) | 1 | **105952** |
| 2 | Vis Hc M6 x 8,8 | Screw Hc M6 x 8.8 | Schraube Hc M6 x 8,8 | 1 | ✜ |
| 3 | 1/2 Manchon moteur | Motor side coupling | Kupplungshälfte | 1 | **065742** |
| 4 | Intercalaire | Plastic coupling | Kupplungstern | 1 | ■ |
| 5 | Vis CHc M6 x 40 | Screw CHc M6 x 40 | Schraube CHc M6 x 40 | 4 | ✜ |
| | * Moteur livré sans câble mais équipé avec 2+3+4 | * Delivered without cable but equipped with 2+3+4 | * ohne Netzkabel aber mit 2+3+4 einrichtet | | |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✜ Lot visserie / Screw kit / Schraubensatz

| CÂBLE ÉLECTRIQUE POUR MOTEUR MONOPHASÉ / ELECTRICAL CABLE FOR SINGLE PHASE MOTOR / NETZKABEL FÜR WECHSELSTROMMOTOR (L = 2M) | | | |
|---|---|---|---|
| **DÉSIGNATION** | **SPECIFICATION** | **BENENNUNG** | **REF. P/N Bestell. Nr** |
| USA (Basse tension) | USA (Low voltage) | Netzkabel (Niederspannung) (USA) | **103567** |
| USA (Haute tension) | USA (High voltage) | Netzkabel (Hochspannung) (USA) | **103898** |
| EUROPE | EUROPE | Netzkabel (EUROPA) | **103566** |
| JAPON (Basse tension) | JAPAN (Basse tension) | Netzkabel (Niederspannung) (JAPAN) | **103567** |
| JAPON (Haute tension) | JAPAN (Haute tension) | Netzkabel (Hochspannung) (JAPAN) | **104559** |
| ROYAUME UNI | UNITED KINGDOM | Netzkabel (GB) | **104411** |
| SUISSE (Coudé) | SWITZERLAND (elbow) | Netzkabel (SCHWEIZ) | **A459212** |

**Des moteurs spéciaux sont disponibles sur demande (anti-déflagrant…)**
**Specific motors are available on request (Explosion-proof…)**
**Spezialmotore (z.B. explosionsgeschützt) sind auf Anfrage erhältlich**

# Plan du système bulleur
# Bubbler system drawing
# Bubbler system Gesamtplan




## Nomenclature du système bulleur / Bubbler system part list / Bubbler system Nomenklatur

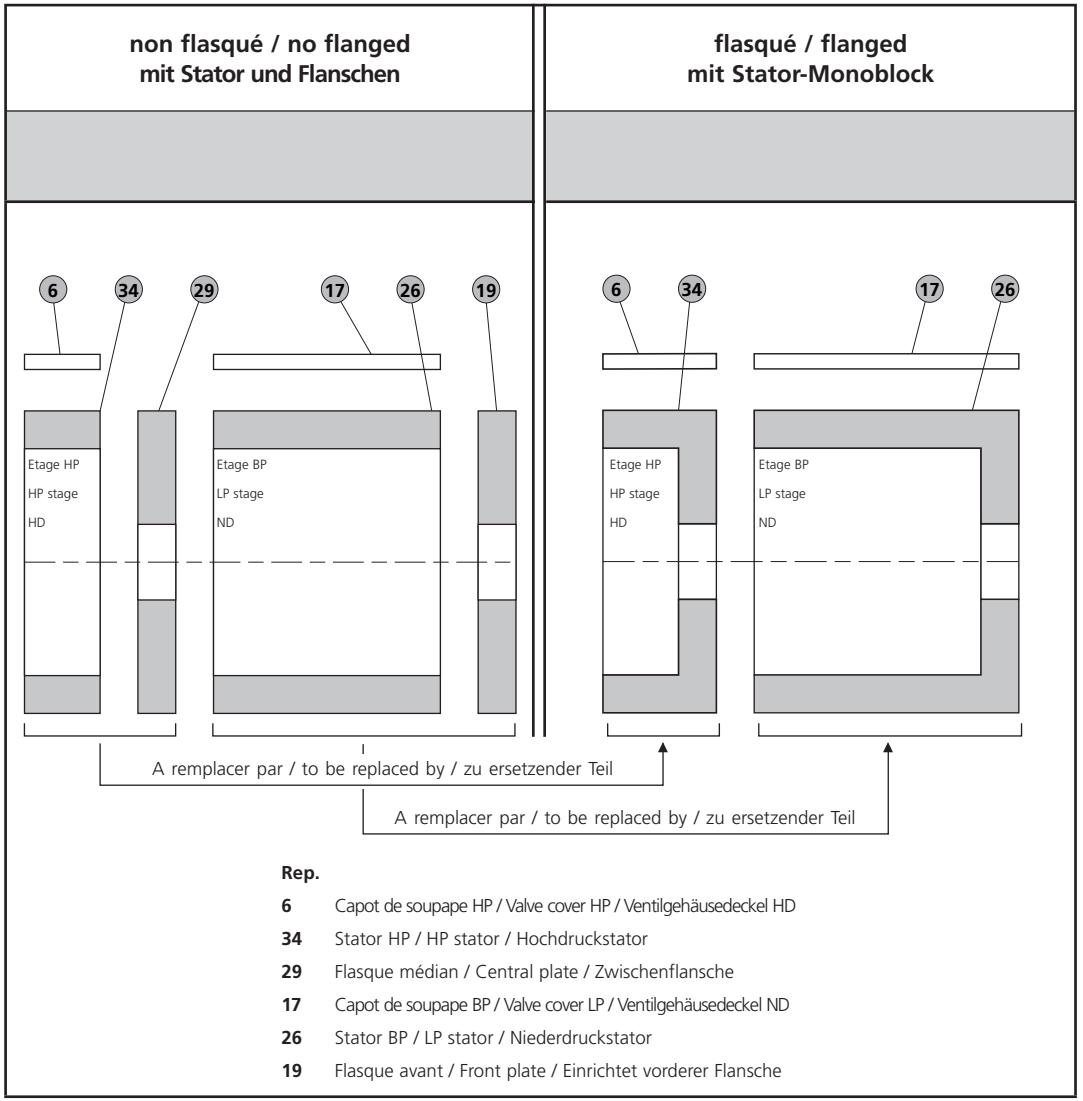
| REP | DÉSIGNATION | SPECIFICATION | BENENNUNG | Types/model | | | REF. P/N Bestell. Nr |
|---|---|---|---|---|---|---|---|
| | | | | 2010 C2 | 2015 C2 | 2021 C2 | |
| 1 | Bouchon 1/8 NPT | Plug 1/8 NPT | Blindstopfen 1/8 NPT | 1 | 1 | 1 | **082926** |
| 2 | Manchon | Coupling | Kupplung | 1 | 1 | 1 | **065866** |
| 3 | Ruban teflon | Teflon band | Teflon band | 1 | 1 | 1 | **060975** |
| 4 | Bille inox 18/8 d. 5,8 | Ball 18/8 d. 5.8 | Kugel 18/8 d, 5,8 | 1 | 1 | 1 | **087593** |
| 5 | Ressort | Spring | Feder | 1 | 1 | 1 | **065149** |
| 6 | Raccord G 1/8 -1/8 NPT | Connector G 1/8 -1/8 NPT | Verbindungselement | 1 | 1 | 1 | **065867** |
| 7 | Joint torique c 1,9 - d 7,2 | O-ring c 1.9 - d 7.2 | Dichtung c 1,9 - d 7,2 | 1 | 1 | 1 | ● |
| 8 | Bulleur | Bubbler | Bubler | 1 | 1 | | **065836** |
| 8 | Bulleur | Bubbler | Bubler | | | 1 | **065835** |
| 9 | Attache tube | Tube fastener | Rohrbefestigung | 1 | 1 | 1 | **065835** |

● Lot joints / Minor kit / Dichtungssatz ■ Lot maintenance / Major kit / Wartungssatz ✜ Lot visserie / Screw kit / Schraubensatz

# Remplacement des pièces du bloc fonctionnel non flasqué
# Pumping module (with no flanged stator) spare parts
# Pumpenblock (mit Stator und Flanschen) Unterhaltung Teile

## Modèles 2 étages / 2 stage models / Zweistufige Modelle

| Modèle Model Modele | Bloc fonctionnel / Pumping module / Pumpenblock | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | non flasqué / no flanged mit Stator und Flanschen | | | flasqué / flanged mit Stator-Monoblock | | | | | |
| | Pièce à remplacer Part to be replaced Zu ersetzender Teil | Référence P/N Bestell. Nr | | Référence P/N Bestell. Nr | | | | | |
| 2005 C1 | Flasque avant (C) Front plate Einrichtet vorderer Flansche | 19 | 103396S | 26 | A006037S | + | 17 | - |
| 2010 C1 / C2 | | | | | A006038S | | | A332176 |
| 2015 C1 / C2 | | | | | A006039S | | | A332266 |
| 2021 C1 / C2 | | | | | A006040S | | | A332175 |
| 2005 I / SD / SDI | Flasque avant (standard) Front plate Einrichtet vorderer Flansche | 19 | 103401S | | A006001S | | | - |
| 2010 I / SD | | | | | A006000S | | | A332176 |
| 2015 I / SD | | | | | A005999S | | | A332266 |
| 2021 I / SD | | | | | A005997S | | | A332175 |
| 2005 C1 | Flasque médian (C) Central plate Zwischenflansche | 29 | 103410S | 34 | A006042S | + | 6 | A332166 |
| 2010 C1 / C2 | | | | | | | | |
| 2015 C1 / C2 | | | | | | | | |
| 2021 C1 / C2 | | | | | | | | |
| 2005 I / SD | Flasque médian (standard) Central plate Zwischenflansche | 29 | 103408S | | A005996S | | | |
| 2010 I / SD | | | | | | | | |
| 2015 I / SD | | | | | | | | |
| 2021 I / SD | | | | | | | | |
| 2005 SDI * | | | 105639 | | A006496S | | | |
| 2005 C1 | Stator HP HP stator Hochdruckstator | 34 | 103409S | 34 | A006042S | + | 6 | A332166 |
| 2010 C1 / C2 | | | | | | | | |
| 2015 C1 / C2 | | | | | | | | |
| 2021 C1 / C2 | | | | | | | | |
| 2005 I / SD | | | | | A005996S | | | |
| 2010 I / SD | | | | | | | | |
| 2015 I / SD | | | | | | | | |
| 2021 I / SD | | | | | | | | |
| 2005 SDI * | | | 065722S | | A006496S | | | |
| 2005 I / SD / SDI | Stator BP LP stator Niederdruckstator | 26 | 103507S | 26 | A006001S | + | 17 | - |
| 2005 C1 | | | | | A006037S | | | |
| 2010 I / SD | | | 103512S | | A006000S | | | A332176 |
| 2010 C1 / C2 | | | | | A006038S | | | |
| 2015 I / SD | | | 103510S | | A005999S | | | A332266 |
| 2015 C1 / C2 | | | | | A006039S | | | |
| 2021 I / SD | | | 103393S | | A005997S | | | A332175 |
| 2021 C1 / C2 | | | | | A006040S | | | |


non flasqué / no flanged
mit Stator und Flanschen
flasqué / flanged
mit Stator-Monoblock
6
34
29
17
26
19
Etage HP
HP stage
HD
Etage BP
LP stage
ND
A remplacer par / to be replaced by / zu ersetzender Teil
A remplacer par / to be replaced by / zu ersetzender Teil
Rep.
6 Capot de soupape HP / Valve cover HP / Ventilgehäusedeckel HD
34 Stator HP / HP stator / Hochdruckstator
29 Flasque médian / Central plate / Zwischenflansche
17 Capot de soupape BP / Valve cover LP / Ventilgehäusedeckel ND
26 Stator BP / LP stator / Niederdruckstator
19 Flasque avant / Front plate / Einrichtet vorderer Flansche

* Dans ce cas, changer également le rotor HP (31) (voir nomenclature du bloc fonctionnel avec stator flasqué (C) (page N-13)) et utiliser le lot de maintenance SDI (voir page 47).
* In this case, replace also HP rotor (31) (refer to pumping module with flanged stator (C) (page N-13)) and use a SDI major kit (see page 47).
* In diesem Fall ebenfalls den Hochdruckrotor (31) auswechseln (siehe Nomenklatur des Funktionsblocks mit geflanschtem Stator (Alter N - 13)) und SDI-Wartungssatz verwenden (siehe Seite 47).

## Nomenclature

# Remplacement des pièces du bloc fonctionnel non flasqué
# Pumping module (with no flanged stator) spare parts
# Pumpenblock (mit Stator und Flanschen) Unterhaltung Teile

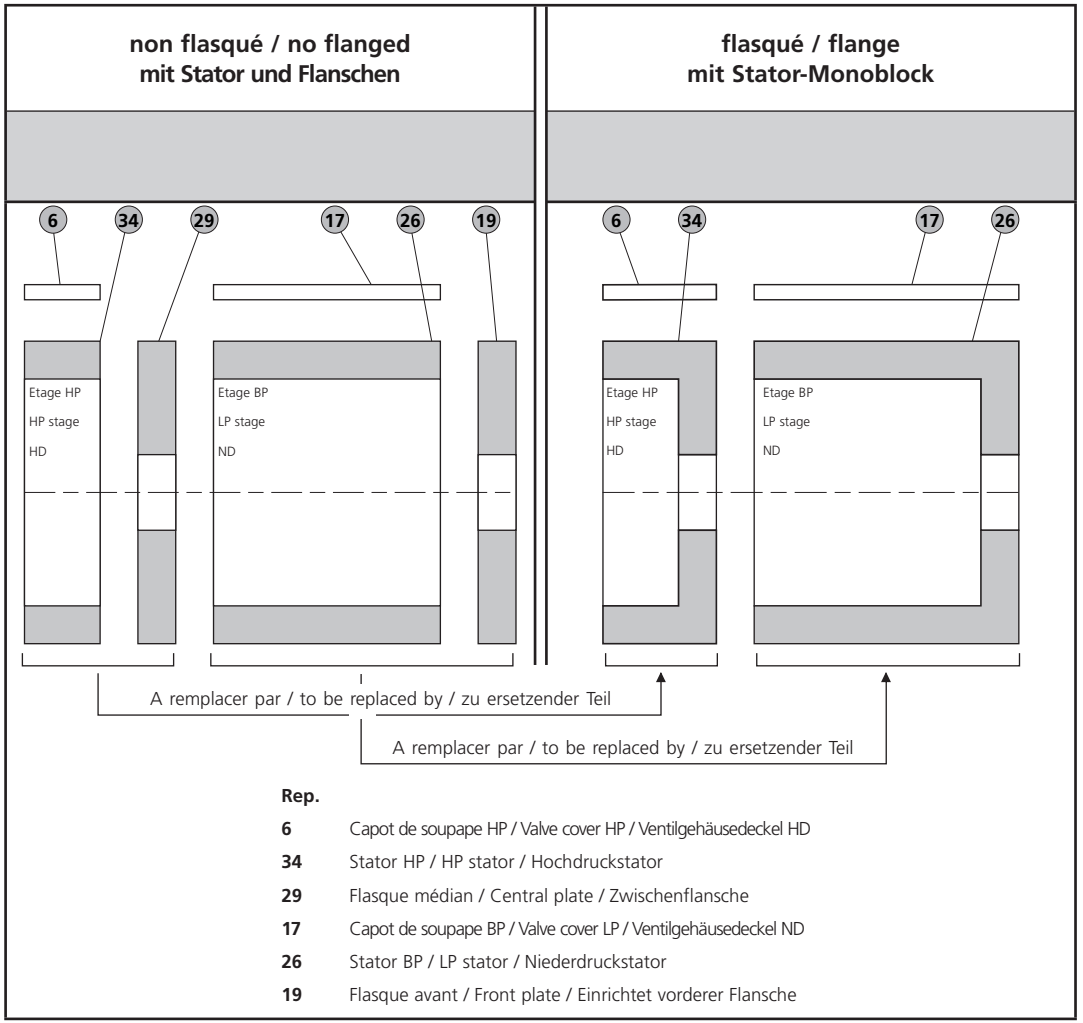
## Modèles 2 étages / 2 stage models / Zweistufige Modelle

| Modèle Model Modele | Bloc fonctionnel / Pumping module / Pumpenblock | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | non flasqué / no flanged mit Stator und Flanschen | | | flasqué / flanged mit Stator-Monoblock | | | | | |
| | Pièce à remplacer Part to be replaced Zu ersetzender Teil | Référence P/N Bestell. Nr | | Référence P/N Bestell. Nr | | | | | |
| 2005 C1 | Capot de soupape HP<br>Valve cover HP<br>Ventilgehäusedeckel HD | **6** | 103521 | **34** | A006042S<br>A005996S<br>A006496S | + | **6** | A332166 | |
| 2010 C1 / C2 | | | | | | | | | |
| 2015 C1 / C2 | | | | | | | | | |
| 2021 C1 / C2 | | | | | | | | | |
| 2005 I / SD | | | | | | | | | |
| 2010 I / SD | | | | | | | | | |
| 2015 I / SD | | | | | | | | | |
| 2021 I / SD | | | | | | | | | |
| 2005 SDI* | | | | | | | | | |
| 2005 I / SD / SDI | Capot de soupape BP<br>Valve cover LP<br>Ventilgehäusedeckel ND | **17** | - | **26** | A006001S | + | **17** | - | |
| 2005 C1 | | | | | A006037S | | | | |
| 2010 I / SD | | | 103523 | | A006000S | | | A332176 | |
| 2010 C1 / C2 | | | | | A006038S | | | | |
| 2015 I / SD | | | 103525 | | A005999S | | | A332266 | |
| 2015 C1 / C2 | | | | | A006039S | | | | |
| 2021 I / SD | | | 103394 | | A005997S | | | A332175 | |
| 2021 C1 / C2 | | | | | A006040S | | | | |

* Dans ce cas, changer également le rotor HP (31) (voir nomenclature du bloc fonctionnel avec stator flasqué (C) (page N-13)) et utiliser le lot de maintenance SDI (voir page 47).

* In this case, replace also HP rotor (31) (refer to pumping module with flanged stator (C) (page N-13)) and use a SDI major kit (see page 47).

* In diesem Fall ebenfalls den Hochdruckrotor (31) auswechseln (siehe Nomenklatur des Funktionsblocks mit geflanschtem Stator (Alter N - 13)) und SDI-Wartungssatz verwenden (siehe Seite 47).


non flasqué / no flanged
mit Stator und Flanschen
flasqué / flange
mit Stator-Monoblock
6
34
29
17
26
19
Etage HP
HP stage
HD
Etage BP
LP stage
ND
A remplacer par / to be replaced by / zu ersetzender Teil
A remplacer par / to be replaced by / zu ersetzender Teil
Rep.
6 Capot de soupape HP / Valve cover HP / Ventilgehäusedeckel HD
34 Stator HP / HP stator / Hochdruckstator
29 Flasque médian / Central plate / Zwischenflansche
17 Capot de soupape BP / Valve cover LP / Ventilgehäusedeckel ND
26 Stator BP / LP stator / Niederdruckstator
19 Flasque avant / Front plate / Einrichtet vorderer Flansche

# Remplacement des pièces, bloc fonctionnel non flasqué
# Pumping module (with no flanged stator) spare parts
# Pumpenblock (mit Stator und Flanschen) Unterhaltung Teile

## Modèles 1 étage / 1 stage models / Einstufige Modelle

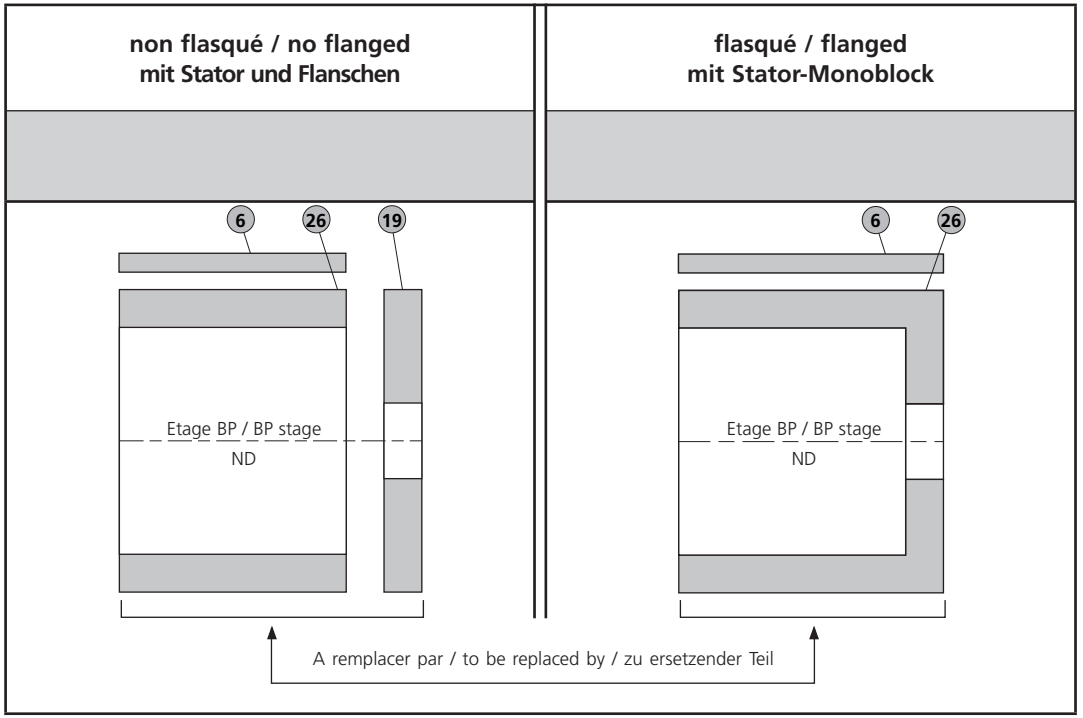
| Modèle<br>Model<br>Modele | Bloc fonctionnel / Pumping module / Pumpenblock | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | non flasqué / no flanged<br>mit Stator und Flanschen | | | flasqué / flanged<br>mit Stator-Monoblock | | | | | |
| | Pièce à remplacer<br>Part to be replaced<br>Zu ersetzender Teil | Référence<br>P/N<br>Bestell. Nr | | Référence<br>P/N<br>Bestell. Nr | | | | | |
| 1005 SD | Flasque avant (standard)<br>Front plate<br>Einrichtet vorderer Flansche | **19** | 103401S | **26** | A006465S | + | **6** | A332166 |
| 1015 SD | | | | | A006466S | | | A332900 |
| 1005 SD | Stator BP<br>LP stator<br>Niederdruckstator | **26** | 103409S | **26** | A006465S | + | **6** | A332166 |
| 1015 SD | | | 103882 | | A006466S | | | A332900 |
| 1005 SD | Capot de soupape BP<br>Valve cover LP<br>Ventilgehäusedeckel ND | **6** | 103521 | **26** | A006465S | + | **6** | A332166 |
| 1015 SD | | | 103521 | | A006466S | | | A332900 |

**Rep.**

**6** Capot de soupape / Valve cover / Ventilgehäusedeckel

**26** Stator BP / LP stator / Niederdruckstator

**19** Flasque avant / Front plate / Einrichtet vorderer Flansche



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